DEDICATED TO H.R.H. PRINCE ALBERT, K.G., ETC., ETC., ETC.

TALLIS'S

HISTORY AND DESCRIPTION

OF THE

CRYSTAL PALACE,

AND THE

Exhibition of the World's Industry in 1851;

ILLUSTRATED BY

BEAUTIFUL STEEL ENGRAVINGS,

FROM ORIGINAL DRAWINGS AND DAGUERREOTYPES,

BY BEARD MAYALL, ETC., ETC.

EDITED BY J. G. STRUTT, ESQ.

VOL. II.

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Engraved by T. Hollis, from a Daguerreotype by Mayall.

GREAT EXHIBITION, MAIN AVENUE,

LOOKING WEST.

TALLIS'S HISTORY AND DESCRIPTION

OF

THE CRYSTAL PALACE.

CHAPTER I.

PAPIER MACHE—INVENTED IN FRANCE—INTRODUCED INTO BIRMINGHAM — JENNINGS AND BETTRIDGE — CLAY—BIELEFIELD—METHOD OF PREPARATION—BELL'S "VICTORIA REGIA" COT —ELIZABETHAN CHAIR—OXFORD SPECIMENS BY SPIERS AND SON—EMBOSSED LEATHER—ITS GREAT ANTIQUITY — ANNE BOLEYN'S TOWER — M. DULUD—A. DESPREAUX — LEAKE—PAPER STAINING, HANGINGS, ETC.: HISTORY AND IMPROVEMENT—FRENCH, RUSSIAN, AND ENGLISH EXHIBITORS—MAGNUS'S ENAMELLED SLATE—SCAGLIOLA—MODE OF PREPARATION—DOLAN'S GOTHIC ARCH—ORSI AND ARMANI'S METALLIC LAVA—IMITATIONS OF FLORENTINE MOSAICS.

Among the numerous articles displayed at the Exhibition, there were few which, in their manufactured or finished state, were more attractive to the sight, or which had higher claims to the admiration of the visitor, than those formed of the material known as papier-mâché. Whether in the shape of domestic furniture, to which it has recently been applied, or in articles of general domestic utility, its beauty and agreeableness are equally striking. Indeed, such is the nature of the material—so ductile, so light, and so economical—that it appears adapted for almost universal application. Admitting a polish almost equal to that of glass itself, and receiving colours nearly as bright as those capable of being placed upon canvas, it furnishes a most attractive surface alike to the industrial skill of the humble artisan and to the genius of the artist.

The merit of inventing this beautiful and useful material is claimed by our French neighbours, and the manufacture of the article is carried on to a great extent in Paris; but in the application of this substance to articles of general domestic utility and ornament, it cannot be disputed that we are far ahead at present, not only of France, but of the entire Continent. Indeed, to such an extent is it carried out, that it may almost be considered an industrial art peculiarly our own; and for papier-mâché work Birmingham stands unrivalled. There is an active competition between the English and French work in France itself; indeed, so keenly is the competition felt by our neighbours, that they impose an exceedingly heavy duty upon its importation, amounting almost to a pro-

hibition upon the low-priced articles. The manufacture of papier-mâché articles was, we believe, first introduced into Birmingham by Messrs. Jennings and Bettridge, of Halkin-street, Knightsbridge—their principal manufactory being at Birmingham—about half a century since. At this stage of the manufacture tea-trays only were made. The inventor and patentee of the manufacture of tea-trays in papier-mâché was Mr. Clay, of Birmingham. The firm has, from the commencement, gradually proceeded to develop the capabilities of this material by adapting it to new purposes, until the variety of articles now produced is almost innumerable. Articles of furniture made from it, such as chairs, tables, sofas, cabinets, secretaires, screens, vases, and even pianofortes, were displayed at the Exhibition, with writing-desks, work-boxes, papeteries, inkstands, &c., in almost endless variety of style and decoration.

In addition to these purposes, the material has been applied for scrolls, foliages, cornices, mouldings, and other articles of internal decoration. Saloons and halls are decorated with panels of papier-mâché, in a style which has all the beautiful effects of enamelling; and under ordinary circumstances has been found to be remarkably durable. Admirable specimens of panel-work, formed of this substance, are also to be seen in the saloons of the Europa, Asia, Africa, Hindostan, and Oriental steam-packets; but we question whether the material is adapted to bear the constant wear and tear caused by the jarring and shaking of steam-power and weather combined. Mr. C. Bielefield, of Wellington-street, Strand, has, by his skill and enterprise, done much for the extended use of this material for all kinds of ornamental purposes, whether required for flat surfaces, or in the most elaborate picture and glass frames. In the manufacture of papier-mâché, the paper used is similar in texture to ordinary blotting-paper, but of a grey colour. Prior to using it, it is well saturated with flour and glue, mixed with water, in about equal proportions, and is then laid on the mould of the article intended to be produced. These moulds are of iron, brass, or copper. The mould, coated with the first layer of paper, is then dried at a heat of 90 or 100 degrees Fahr., for twelve hours. A careful smoothing by a file follows, after which another deposit of paper is made. The processes of drying and smoothing are successively repeated with each additional layer of paper, until the article assumes the required strength and thickness, some commodities having been made of six inches in thickness. An ordinary tea-tray, of a quarter of an inch in thickness, takes about thirty sheets of paper, or ten layers. When the newly-formed article is taken from the mould, the several parts are planed, filed, and trimmed, so as to be correct and level. A process of "stoving" next follows, in which the varnish is laid on, and brought to a smooth, hard, and brilliant surface. This completed, the most delicate portion of the manufacture commences. The article is coated with several layers of shell-lac varnish, coloured, which, after being hardened by a heat of 280 degrees, are scraped level with implements of various degrees of smoothness. The different varnishings, with the subsequent operations, are carried on for a period varying from twelve to eighteen days, according to the purpose for which the article is required. The exquisite surface which characterizes the finished goods is a distinguishing feature of this material. It is produced by manual polishing with rotten stone and oil; but the finish of the articles—the peculiar brilliancy which lends such a freshness to the painting—is produced independently of rotten stone or other powder, by the process of "handing" alone. Among the largest exhibitors of this article were Messrs. Jennings and Bettridge, Messrs. Jackson and Son, of Rathbone-place, Messrs. M'Callam and Hodgson, Mr. Lane, and Messrs. Spiers and Son, of Oxford. Among the specimens shown by Messrs. Jennings and Bettridge, is perhaps the most extraordinary article yet produced in this material—a case for a pianoforte, with music-stool and canterbury, designed in the Italian style, and treated with great simplicity of decoration; the only

ornament employed being variously-tinted pearl, the effect of which on the jet-black of the case is very rich, and at the same time exceedingly chaste.

The "Victoria Regia" cot, designed by Mr. J. Bell, sculptor, and highly wrought in gold and colours with emblematical devices, attracted considerable notice, but was not to our taste, the colours being gaudy and cold, and the shape by no means graceful. There were also—A "multum in uno" loo-table on a new principle, combining bagatelle-board, chess, draughts, &c., ornamented with inlaid pearl and gold. A lotus work-table, designed by Mr. Bell, fitted on a new principle, and decorated in a style appropriate to the form. A lady's work-table, of a shape suggested by the celebrated vase of Benvenuto Cellini, richly inlaid with pearl and gilt. "The day-dreamer" chair, designed by Mr. H. Fitz-Cook, and ornamented with figures, flowers, &c., allegorically arranged, had a curious and novel appearance; but saying that, we have said all. The figures, emblematical of sleep, dreams, good and bad, were too fanciful and too large, and the colour, generally, was cold and uncomfortable. A "légère" chair, inlaid with pearl, was remarkable for its light elegance combined with strength. A "Prie-Dieu" chair. A chair, styled Elizabethan, was more properly after the form of the period of William III. Several trays, including the "Pacha's" tray, ornamented in gold and colours, 58 inches in diameter. The contributions of Messrs. Spiers and Son, of Oxford, consisted of tables, cabinets, desks, work-boxes, albums, portfolios, waiters, tea-caddies, &c., ornamented with views of the colleges, public buildings, college gardens, and other objects of interest in the University and its neighbourhood. We noticed in them endeavours after a truer and less meretricious style of ornamentation than usually prevails. As the taste of the Oxford people seems to run in a contrary direction to that of the usual purchasers of this description of goods, this firm has taken up the ornamentation of papier-mâché in a new style. Instead of adopting the usual subjects of birds, flowers, Chinese landscapes, arabesques, or other less pleasing styles, they conceived that picturesque representations of architectural and landscape subjects, treated in an artist-like manner, to which other ornament should be subservient, would be equally interesting to many persons, equally popular, and more conducive to the diffusion of a sound taste. Messrs. Spiers immortalised their native and most learned city in every possible point of view, and upon every possible variety of article. We had Oxford from the fields, and Oxford from the river, Oxford in the streets, Oxford colleges, Oxford halls, Oxford staircases, and Oxford seals. These paintings, which were scattered over desks, tables, secretaires, and work-boxes, were all beautifully executed.

EMBOSSED LEATHER.

The specimens of Embossed, or Relievo Leather, in the Crystal Palace, although exhibited but by three firms, two French and one English, identical in their manufacture and mode of treatment, were of sufficient importance to demand a distinct notice. From all that we can collect in reference to the earliest history of the art, it is clearly to be traced as far back as 900 years before Christ, the British Museum possessing some scraps and pieces of gilt leather straps taken from mummies, upon which are relieved figurements of King Orsokon adoring the god Bhem, and others of Amoun Ra Harsaphes. Italy, Spain, and Flanders, centuries ago, were eminent for their relieved leather, the flat or groundwork of which was usually gilded, silvered, or coloured; and recently Germany, France, and more especially Great Britain, took the lead in this department of art manufacture. An able writer, while dwelling with much gusto upon this subject, says, the distinct relief in which the patterns could be embossed, the brilliancy of colour of which the leather was susceptible, the high burnish which could be given to the gold, the durability, ease of application, and resistance of damp, rendered

the material peculiarly fitted for panels and hangings. It was a warm and gorgeous covering for the walls, affording infinite scope for art, taste, workmanship, and heraldic emblazonment, and the exclusiveness of wealth, and was therefore largely used in the decoration of palaces and baronial halls. At Blenheim, Hinchinbrook House, Norwich Palace, Knockton Hall, at Lord Scarborough's, and in many private collections, leather tapestries are still to be found, preserving the utmost brilliancy of colour and gilding. Some of the leather tapestries at Hinchinbrook, it is said, bore the name of Titian. About 1531, or 1532, Henry VIII. built a manor-house near Eastham Church, in Essex, with a high, square tower, that during her sort of year of probation Anne Boleyn might enjoy the prospect of the Royal Park at Greenwich. This tower had hangings of the most gorgeous gold leather, which remained until fifty years since, when the house coming into the hands of a proprietor with no especial love for the memory of the bluff Harry, nor the sad hauntings of the fate of Anne Boleyn, nor the old art and workmanship of leather decoration, but a clear perception that in so many yards of gilt leather, there must be some weight of real gold, had the tapestries taken down, sent to the goldsmith's furnace, and some £60 worth of pure gold gathered from the ashes. In the French department, No. 1202, M. Dulud, of Paris, exhibited several pieces of tapestry and ornamental hangings in embossed leather, which appeared identical in subject and the method of their preparation with those of Mr. Leake in the Fine Art Court. He likewise showed two elbow-chairs, lined with embossed leather, and other articles of furniture similarly decorated, amongst which a cabinet was the best, and which served admirably to shew the fitness of leather, where the appearance of elaborate carving is required. Opposite to these was No. 164, A.A. Despreaux, a collection of Venetian leathers of similar pretensions, but differing as widely as possible in their result. The patterns selected as models are well known by us to be very admirably adapted for the purpose; but whether to disguise the original source, or from inefficiency in the operatives, nothing could have been more impotent than the conclusion, and scarcely anything more execrable in taste, than the method in which they were daubed with colour. All drawing, all grace, and all notions of chromatic harmony were cast to the winds. If these in any way resembled the decorated leathers at the period of their decline and ultimate abandonment, we can scarcely wonder at the total extinction of this branch of art manufacture in those countries which were eager to appreciate it in its palmy days. Mr. Leake's (of Warwick-street, Golden-square) collection was in the Fine Art Court. To this exhibitor's perseverance we are indebted for the revival of this branch of art manufacture in this country; and we do but justice in stating, that the models from which he has hitherto made selections are of the very best and most classic styles.

PAPER-STAINING, HANGINGS, ETC.

The following general account of the arts of paper-staining and hanging, is abridged, with slight alteration, from Grant's interesting little volume, *The World and its Workshops*:—The art of paper-staining and paper-hanging has now become one of the most interesting and useful branches of industry, whether viewed in relation to the amount of skilled labour and capital employed, or the elegance, refinement, and convenience which it supplies to our social wants. Paper-hangings are of comparatively modern date, being originally manufactured as a cheap imitation of the rich stuffs and tapestries used by the wealthy and great in the coverings of the walls and wainscotings of their apartments. The French, we believe, were the first to bring them into general use.

Paper-hangings may be divided, for convenience sake, into three branches—the flock, the metal, and the coloured. Each of these appears to have been invented at different times, in imitation of a material then much in vogue, as, for instance, the flock to imitate

the tapestries, the coloured to imitate the gilt leather which the Spaniards brought into general use, and, lastly, the metal, which was intended as an economical substitute for painted decorations. Beckman, in his *History of Inventions*, states that flock paper was first manufactured in England, by one Jerome Lanyer, in the reign of Charles I.; the *Dictionary of Commerce*, of 1723, under the head of *dominoterie*, or marble paper, such as is used by the old bookbinders, gives a minute description of the mode of printing the latter, and cites statutes to regulate the industry, dated 1586, in which rules are given as to what kind of presses are to be used by the *dominotiers*, and prohibiting them, under heavy penalties, from printing with types. Here we catch a glimpse of the keen-eyed vigilance of the Romish church, which dreaded the progress of the Reformation, then spreading fast and far into every region of human thought. From the preceding relation, it is fair to infer that block-printing was first practised in France. It is evident that the art of paper-staining and paper-hanging was carried on in this country to a considerable extent, from the time of Charles I. down to Queen Anne; and its subsequent history may be traced, with comparative accuracy, by the decorations adopted by the nobility and gentry, several of which are still preserved, either on the walls of their apartments, or in the works devoted to the illustration of their mansions. In the year 1712, the tenth of Anne, a duty of $1\frac{3}{4}d.$ per square yard was imposed on the manufacture of stained-paper; and some of the flock-paper, one hundred years old, resembles, in every respect, the modern material. The art of flocking, in fact, was disused, and almost lost, during a period of twenty years, and revived only about sixty years ago. There were formerly three modes in which paper-hangings were manufactured — by printing the outline with blocks, and then colouring by hand, by stencilling, and by blocks alone. The first of these methods is that adopted by the *dominotiers*. The second, stencilling, is performed by cutting out either on paper, leather, or other materials, the pattern to be represented, and then placing this on the proposed ground, and brushing it over with the proper colour. This mode gives an imperfect outline, and is seldom used, except by plasterers, to ornament coloured walls. The third is the mode now almost universally adopted, whereby every colour is applied by a separate block, according to the tints and shadows intended to be represented: but within the last two years a great improvement has been effected in this mode of paper-staining, by using several colours on one block, which is a great saving both in labour and cost, besides producing a more effective article at the same price. The Messrs. Potter, we believe, were the first to introduce this improvement, which has since been successfully followed up by Messrs. Hinchliff, who, on some occasions use as many as twenty-five colours on a single block, the effect of which, upon the labour cost of the article, may easily be conceived. The contributions to the Exhibition, in this branch of industry, were peculiarly rich and diversified; and, as was to be expected, France, if we may be allowed such a metaphor, was the radiant star on the horizon. The specimens of M. Delicourt, Mader Frere, and Genoux, left our manufacturers at a considerable distance, as regarded the highest class of paper-staining.

The papers in the Russian contribution were more curious than effective in style and execution; in almost every respect they were inferior to those from Austria, and much below those of Belgium, France, and England. America, we think, was about upon a par with Russia in this respect. In 1754, Jackson, of Battersea, a manufacturer, published a pamphlet on the invention of printing in chiar'-oscuro, and its application to paper-hangings, which he executed in imitation of the most celebrated classic subjects; and various attempts have since been made in the same path; the last, and one of the boldest, is that of Jeffrey and Allen, who have used what they considered the best portion of the Elgin-frieze, in twenty-four feet of length. Scott, Cuthbertson, and Co.,

showed a simple and handsome Tudor panelling in the eastern gallery. The effect of the gold upon a white ground, as the paper was hung, was necessarily much softer than the drawing would suggest: the border, however complex, was by no means confused; much of this might be owing to the quantities of colour, which, as in their other paper, was a bold attempt at reconciling apparently equally forcible colours. Turner's *cerise* was particularly elegant and lady-like. These patterns excited unusual attention, on account of the precision claimed for the manual labour of printing the blocks. The test is very simple, and the same part of the sheet of paper may receive ten or a dozen blows from the blocks without slipping, or causing a faulty impression. This pattern was a design by Marchand, of Paris. Underneath it were two patterns, which possessed the property of altering their appearance as the eye of the spectator moved, becoming alternately light on a dark ground, and dark on a light ground pattern. This effect of "glancing," as it is now termed, has not been introduced by this house so much as twelve months, and is still a novelty. Townshend, Parker, and Co., had an arabesque paper pattern, quite good enough for hand painting. This certainly was considered the most praiseworthy of this class of productions. Their plain flocks on each side of it gained by the contrast: for their purity and neatness of outline, joined to the solidity of the flocking, were well set off by the general deep tones of the arabesque.

ENAMELLED SLATE.

As we are on the subject of artistic decoration, we shall now direct the attention of our readers to a very interesting manufacture, which, from the various elegant articles exhibited in its department, attracted general attention and admiration. We refer to imitations of costly marbles in slate. So perfectly faithful indeed were these imitations, that foreign visitors especially, could with difficulty be persuaded that they were not the precious materials themselves. On the ground of novelty, enamelled slate stands unrivalled, for, until the last few years, the uses of slate were limited to the roughest purposes. An occasional piece had indeed been smoothed, painted, and varnished in the style of tea-trays, and ornamented with a flower or bird in the Birmingham fashion; but it remained for Mr. Magnus, of Pimlico, to display its full capabilities, who, by means of a new, very simple, and inexpensive process, has succeeded in producing works of great magnitude and importance, calculated to effect the introduction of slate for household purposes on a very extensive scale. The advantages of the material as thus used, consist in its great strength, its lightness, as compared with that of marble, and its adaptability to all kinds of artistic decoration at a small cost. With regard to the strength of slate, it is computed to be about four times that of ordinary stone, and slabs eight feet long and upwards can be very safely used of thicknesses not exceeding half-an-inch. The extreme compactness of the material, and its perfect non-absorbent qualities, render it well adapted as a lining for walls, where it may be placed without even plastering. In this respect it is preferable to any kind of cement. In the decoration, the exact method of laying on the colour is not communicated; but the slate, after being coloured, is exposed for several days to a temperature of from 300 to 500 degrees Fahr., and the colours are thus rendered so permanent, that washstand-tops, and other articles used in hotels for years, have been scarcely injured by wear. In respect also of its peculiarly smooth and perfect surface and fine texture, it is admirably adapted for various ornamental and useful purposes, and grooves, mouldings, &c., are run with great despatch and at small cost by steam power. Among the articles displayed by Mr. Magnus was a bath-room of large dimensions, good design, and great beauty, wholly manufactured of decorated slate, and in which representations of porphyry, lapis lazuli, giallo antico, and other marbles and rare stones, were introduced with a pleasing and

artistic effect. A column and vase of porphyry—a splendid billiard-table, the legs and frame of which, as well as the bed, were of slate; several inlaid table-tops, chimney-pieces, candelabra, &c., served to show the many purposes to which this useful, novel, and interesting invention is applicable. To this exhibitor the jury had no hesitation in awarding a prize medal, in acknowledgment of his admirable and useful contrivances and applications.

SCAGLIOLA.

The name Scagliola is derived from the Italian, where the process is said to have been invented more than two centuries ago, but it is now very extensively used for decorative purposes in England. The material consists of a coating of plaster mixed with alum and colour into a paste, and afterwards beaten on a prepared surface with fragments of marble, &c. It is greatly used as an excellent and economical means of imitating the finer kinds of marble, the material being as hard as marble, very durable, cold to the touch, and taking a perfect polish. The cement is prepared from the finest gypsum, broken up before calcining, and afterwards reduced to a fine powder, and passed through a sieve. It is then mixed with aluminous matter, and isinglass, and also with colouring matter, and is afterwards made up with alum; and, as it is generally made use of only where the more beautiful and veined marbles are to be imitated, as many different colours and shades of colour must be mixed up separately as there are in the kind of marble to be represented. Thus prepared, it is ready to be laid on the surface intended to receive it, which has a rough coating of lime and hair already prepared. The different colours having to be laid on and mixed by the hand, the work somewhat resembles that of the fresco painter, everything depending on the skill of the operator in imitating the style, beauty, and veining of the original. When the cement is laid on and has hardened, the surface is prepared for polishing by rubbing it with pumice-stone, and cleansing with a wet sponge. It is then polished by rubbing, first with tripoli and charcoal, then with felt dipped in tripoli and oil, and lastly with oil alone. A durable lustre is thus obtained equal to that of marble.

Several new specimens of scagliola were exhibited, of great merit and beauty, by various exhibitors, among whom Messrs. Stevens and Son, and Messrs. Francis and Sons, received prize medals. The same mark of distinction was also awarded to Mr. Denis Dolan, of Manchester, for a Gothic Arch of a new kind of scagliola. This arch included a clustered column, with base and capital cast in one piece, the artisan preparing a mould, and pouring into it the outer coat, a marble composition, which is allowed to set before the coarse cement of the interior is added, the latter being so contrived as not to interfere by its expansion with the outer coat, but rather insure the union of the two. This new process of casting scagliola work, and some contrivances in polishing, were noticed by the jury as worthy of consideration.

Messrs. Orsi and Armian exhibited a material called metallic lava, which is a plaster capable of being worked into a variety of patterns and colours, well adapted by its beauty, durability, and cheapness, for floorings and other decorative purposes; amongst which was a table in the Moorish style, which was intended for the then President of the French Republic. Two different kinds of the metallic lava were exhibited, one of which was white and ornamental, admitting of the application of mosaic work, and the other brown, and peculiarly adapted for covering roofs and terraces, lining tanks, cisterns, fish-ponds, brickwalls, stables, &c., where a durable, cheap, and impervious covering is required. Both kinds have stood the test of experience, and are known to be well adapted for the object they are intended for. The composition is patented, and the method of laying down a flooring or terrace without joints is both new and advantageous, insuring the

perfect impermeability of the whole to moisture. A prize medal was awarded to these exhibitors.

To Messrs. Della Valle, Brothers, of Leghorn, a prize medal was also awarded, for a new and peculiar manufacture in scagliola, to a certain extent imitative of works in Florentine mosaic, but applied in cases which would be impossible by that process. The objects exhibited consisted of two tables and a vase, all truly inlaid, and having a striking and very brilliant effect. This kind of manufacture differs from ordinary scagliola in the much greater complication of the process, and also in the greater beauty of the result, as the subject included figures and views, which at first would appear hardly possible to be executed in such material, but which showed great labour and skill, and some artistic knowledge in application. One of the objects, a round table, contained a central tableau, surrounded by an azure zone, with several emblematic ornaments. The table itself was of scagliola on a base of marble, each colour composing the ground, and each figure of the central tableau having been first inlaid in a single piece, and then shaded. The lights also were all inlaid, and the general effect was extremely beautiful. It will be seen that the general principle involved, is that of a mixture of fine inlaying without shading. It would appear, however, that the result, although beautiful, is almost too costly to be generally adopted, as the price of the round table referred to, was stated to be £250. The rectangular table, in imitation of pietra dura, and the vase, which was copied from the antique, showed several difficulties incident to the process very successfully overcome. The polish in all the specimens was very good, and entirely natural, no varnish whatever being used.

M. L. Romoli exhibited a scagliola candelabrum, in imitation of giallo antico, designed by L. Gruner, Esq., modelled by Ant. Trentanove, and the property of his Royal Highness Prince Albert; and also a table of inlaid scagliola. This exhibitor was honourably mentioned as exhibiting excellent workmanship in the elegant and costly applications of the material he employed. The candelabrum was not altogether pleasing in its effect, but the workmanship was good. The inlaid table was something in the style of those exhibited by the Messrs. Della Valle, but not at all equal either in design or execution. It appeared also to have been manufactured in a somewhat different manner. A cement mosaic of wood and marble was sent from the Cape of Good Hope for exhibition.

An excellent imitation of stone, extremely hard, perfectly non-absorbent, and resisting all atmospheric action, was exhibited by Messrs. Ransome and Parsons, of Ipswich. This material is a compound of grains of sand, pebbles, portions of limestone, granite, and similar substances, cemented by a true glass, obtained by dissolving flint in a caustic alkali. Besides the ordinary uses to which stone is applied, a porous variety is manufactured for filter stones, which may be supplied at extremely small cost. The Jury awarded a prize medal to these exhibitors for the improved material they have introduced, and the applications of it they have already made.

CHAPTER II.

TOYS.

THEIR IMPORTANCE — PHILOSOPHICAL AND POLITICAL CHARACTER—AMERICA—AUSTRIA AND ITS EXHIBITORS—BAVARIA—BRITISH COLONIES—FRANCE—TOY TRADE IN PARIS—FRANKFORT —HAMBURG—PRUSSIA—SAXONY—SWITZERLAND—UNITED KINGDOM—VALUE OF TOYS IMPORTED—WURTEMBERG.

If, as the poet tells us, "Men are but children of a larger growth," then we shall need no apology for introducing the subject of "Toys" to the consideration of our readers; especially when we call to mind the remark of one of the most eminent of modern philosophers, viz., that "boys' toys are the most philosophical things in the world;" and that of an equally renowned statesman, who, taking another view of their importance, affirms that they are an index to the character of a nation. Now we beg leave to remark, that it is to the toys of the male sex that the observation of the sage philosopher is solely applicable, inasmuch as they are always directed to the more intellectual quality of the masculine understanding, or to its bellicose propensities; whereas the toys contrived for the amusement of the gentler sex are invariably such as minister to the gentler affections of the heart, to tenderness, to love, and the whole range of domestic virtues. In illustration of the first position, as it is observed in the Report of the Juries, a few examples may be cited. A boy's kite, in the hands of a Franklin and a Romas, has served to identify lightning with electricity, and convey an instructive lesson on the composition of mechanical forces. The pea-shooter not only affords evidence of the elastic force of gases, but also of their economical employment when used expansively. The sucker illustrates the weight of the atmosphere, and its equal pressure in all directions; and the sling, the hoop, and the top, show the property of centrifugal force: when the top is in rapid motion, it converts for the moment, every spot and bruise on its surface into an elegant zone, and thus also imparts a good lesson in physiological optics. To a reflecting mind toys afford ample food for thought, and they might be made, perhaps, to yield much solid instruction to the child, were it not generally far more wise, for a certain period, at least, to limit its inquiries rather to the discovery of the weakest parts of its plaything. With regard to the assertion, that toys indicate the genius of a nation, it is evident that, as the natural tendency of children is to imitate the employments of their elders, they will always take the most interest in such toys as will assist them in this propensity, and lead them in their sports to do that which they see those around them doing in earnest. Hence, in countries which are of a military disposition, flags, drums, trumpets, guns, swords, and the accoutrements of soldiers, are much in demand for the pastime of even the youngest boys. In a maritime nation toy-ships will be esteemed, and thus the very pastimes of childhood might be made available in promoting the welfare of such services as the particular state most requires. The Exhibition, therefore, might have afforded an interesting opportunity to statesmen and philanthropists for studying the diversity of character exemplified by the contributing nations, had they been all as well represented in their toys as they were in their other manufactures. This, however, was far from being the case, many countries, although largely employed in the manufacture of toys, having nearly or altogether neglected sending specimens. America, for instance, was extremely deficient in her contribution of toys.

Austria, on the other hand, was well and copiously represented in the toy-trade. From Vienna there were two exhibitors, one of whom sent a great variety of automaton-

toys, and the other a general collection of ordinary toys; military accoutrements, guns, and swords, holding a very prominent position among them, sufficiently indicative of their Haynau and Radetzsky propensities. From Bohemia were sent excellent and very numerous examples of those very beautiful boxes of toys for which it is famous, and which form a large item in the export trade of the country. From the mountains of Tyrol, J. B. Purger contributed numerous specimens of carved white-wood toys, cheap, and of excellent workmanship. The Widow Haller and her Son-in-law, of Vienna, obtained a prize medal for a collection of upwards of three hundred children's toys, comprising dolls, dressed and undressed, miniature furniture, shops, drums, flags, swords, guns, lances, shakos, helmets, and other military accoutrements for children, besides the commoner descriptions of mechanical toys, many of which displayed much ingenuity. There were also numerous other sorts of toys in this collection, which were arranged in the manner of a trophy, and formed the largest group in the Exhibition.

Kietaibl, of Vienna, also received a prize medal for a collection of thirty-nine automaton-toys. These toys, which were all moved by good metallic clock-work, were most ingenious productions, but they appeared to be more expensive than similar manufactures produced in France, with which, unfortunately, the Exhibition afforded no opportunity of comparison. The following were among those deserving of especial notice:—Male and female figures waltzing, the contrivance for effecting the occasional rapid rotation of the German waltz being very ingenious; a pianist, who played, or rather appeared to play, "God save the Queen" and "Rule Britannia;" an elephant carrying a howdah, and four walking Indians carrying a palanquin. This was the only one of detached locomotive figures.

C. A. Muller and Co., of Oberlentensdorf, Bohemia, obtained honourable mention for nearly two hundred boxes of toys. These boxes were filled with excellent figures, representing men and animals, which were modelled in a sort of papier-mâché, with trees and rocks, the former being made of wood and the latter of paper. The different series represented hunting-scenes, zoological gardens, herds of cattle, and numerous other groups illustrative of rural domestic life. The truthful delineation of the various animals is a feature deserving of great commendation, as it renders the toys well adapted to afford instruction as well as amusement.

Bavaria was chiefly remarkable for mechanical and magnetic toys. G. Eichner, of Nuremberg, received a prize medal for twenty mechanical toys. These articles, which were made of tinned iron-plate, and painted, were quite remarkable for the neatness with which they were finished. They consisted chiefly of carriages with horses, the latter being moved by cranks and levers connected with the wheels. A carriage with four horses, the carriage containing figures representing her Majesty and Prince Albert, was worthy of especial notice.

British Colonies.—*British Guiana* sent only a single example. *India,* on the other hand, exhibited a large collection of toys, chiefly from Bengal and Madras. The high antiquity of this manufacture in India will appear from the beautiful Indian drama of *Sacontalá,* written by Calidas, in the first century B.C. "Go, I pray," says an attendant, in Act vii., "to my cottage, where thou wilt find a plaything made for the hermit's child, Sancara; it is a peacock of earthenware, painted with rich colours." Brilliant but rude representations of birds formed the greater part of the display; but there were also some instances of toys which are familiar in England, as the humming-top, the merry-go-round, balancing figures, &c. The collection comprised also several ingenious Malay puzzles, two of which were enclosed in narrow-necked bottles. Figures made in pith were likewise numerous, and were very clever productions. These toys were all such as are in common use in India, on which account they formed a most valuable

contribution to the Great Exhibition; but they were not nearly so well made as those of Europe.

FRANCE.—One of the French exhibitors sent two ingenious drawing-room ornaments, containing automaton-birds, which are toys rather for adults than children. Another exhibitor contributed some excellent wax figures for hair-dressers, which are made by processes similar to those employed for producing the best description of dolls, and they were, therefore, enumerated with toys. But although France manufactures enormous quatities of toys of many kinds, only one description of them was sent, and that by a single exhibitor from Paris, who exhibited dressed dolls only. "In that capital alone," according to the *Statistique de l'Industrie à Paris*, says M. Natalis Rondot, "there were, in 1847, no less than 371 manufacturers of children's toys, employing 2,099 workpeople (641 men, 1,345 women, 80 boys, 33 girls), who in that year produced £172,800 worth of goods." The men earn, on an average, 2*s.* 8*d.* per day, and the women 1*s.* 3½*d.* per day; but some of the men earn 2*s.* 9½*d.*, according to their skill, or the description of work they are employed on. Many of the masters employ only a single assistant, or work alone, and very few employ more than ten assistants. Thus, of the 371 manufacturers, only 62 employed more than ten; 142 employed from two to ten; 77 employed one; and 90 employed no assistant, but did all the work with their own hands. Competition has, it appears, brought down prices so low that dressed dolls, including a bonnet, are to be brought for *eightpence per dozen*, and undressed composition dolls at *twopence-halfpenny per dozen*. It was to be regretted that none of the very excellent automaton-toys, boxes of games, of kitchen utensils, &c., found a place in the French department, as they are exported from France to a considerable extent. Swords, guns, helmets, and other military accoutrements, are also, as might be expected, produced in large quantities in that country, but are disposed of chiefly for the home-trade. Most of the toy-guns are beautifully made, and are generally furnished with percussion-locks, which will fire off a cap. Conjuring toys, for adults as well as children, ought most certainly to have been exhibited, as in the manufacture of these articles Paris has no rival.

BONTEMS, of Paris, received a prize medal for his groups of Humming-birds, with clock-work movements, by which the birds were made to hop from one twig to another, at the same time opening their wings, after which they twirl suddenly round, and hop back again exactly in the manner of real birds confined in a cage. There was also an incessant chirping, apparently kept up by the birds, their beaks being made to move. The levers which carried them backwards and forwards were ingeniously concealed in slits formed in the artificial branches. Other birds were represented continually pecking at beetles. The price of one of these groups of automata was £12, and of the other with the clock, £18. Both groups were under glass-shades, and formed singularly pleasing drawing-room ornaments.

M. P. JUMEAU, also of Paris, received a prize medal for dolls' dresses. The dolls on which these dresses were displayed presented no point worthy of commendation, but the dresses themselves were very beautiful productions. Not only were the outer robes accurate representations of the prevailing fashions in ladies' dresses, but the under garments were also in many cases complete fac-similes of those articles of wearing apparel. They might serve as excellent patterns for children to imitate, and thus to acquire the use of the needle, with a knowledge of the arrangement of colours and material; in the latter respect they might, indeed, afford valuable instruction to adults.

FRANKFORT was chiefly remarkable for the contributions of J. V. ALBERT, who exhibited, among philosophical apparatus, dolls, and the Moor's head conjuring-toy, which admits of a knife traversing the neck without severing the head. The mechanism by which this was effected, though simple, it would be difficult to explain without a diagram.

Prussia.—The principal toys in the Prussian department were those of pewter from Berlin, by G. Sohlke; the principal example being a representation of the review at Windsor, on the occasion of the visit to England of the Emperor of Russia, who was portrayed among the numerous figures which this well-executed model contained. Besides this specimen, there were several miniature dinner and tea services, also cast in pewter. A. Fleischmann, of Sonnenberg, sent a "Philharmonic Chandelier." This very humorous production represented M. Jullien, in the centre at the top, with the performers of his band seated round the circles of the candelabrum, in a great variety of quaint and expressive attitudes, their features and varied action being portrayed with much skill and humour. The same contributor also exhibited a Comic Chandelier, representing one of the incidents in Swift's celebrated romance, when Gulliver wakes in the country of Lilliput, and finds himself "unable to stir." "As I happened," he continues, "to lie on my back, I found my arms and legs were strongly fastened on each side to the ground, and my hair, which was long and thick, tied down in the same manner. I likewise felt several slender ligatures across my body, from my arm-pits to my thighs." Such an incident afforded ample scope for the imagination of the artist, and he proved himself quite equal to the undertaking. There was much humour evinced in the expression and action of the Lilliputians, some of whom were bold enough to push their inquiries so far as to pry into Gulliver's waistcoat pockets, a piece of temerity which was nigh costing one philosophic-looking individual his life. Others of the natives were, however, far more cautious, and mounted, in fancied security, upon the branches of trees, which Gulliver might have blown down with a breath, where they contented themselves with a more distant view: others, again, preferred trusting to the ground and their own legs, and some were already on the start at the first signs of waking on the part of the man-monster; a few slow, dull-headed individuals, not knowing what was taking place, were climbing up on his body, whilst others were precipitately sliding down; and even the Lilliputian horses seemed to have their presentiment of danger, and were becoming unmanageable.

Saxony contributed but a few toys and busts made in pewter. Yet, in 1846, there were 697 manufacturers of wooden toys, who employed 1,520 workpeople.

Switzerland, so famous for its carved white-wood toys, did not exhibit any of these articles, and therefore might be considered as unrepresented in this branch of manufacture. M. Audemars, however, exhibited a beautiful little pistol, weighing only half a grain, and so small that it required a microscope to bring out its details. When it was magnified about twenty times linear, all the various parts might be distinctly seen, and they then appeared beautifully formed and perfect in their polish. Every part, indeed, was as complete and perfect as it is to be found in an ordinary percussion-pistol, so that the lock acted when the trigger was pulled. T. F. Bautte, of Geneva, received a prize medal for a Paper-weight of gold, the base being ornamented with scenery painted in enamel. From this a stem ascended, and was surmounted with a small casket which opened and closed by means of clock-work. When the cover was turned back, a most beautiful and perfect little bird was discovered, which was apparently singing, and at the same time fluttering its minute wings, and twirling about in different directions. As soon as the song was finished the box closed. The bird was scarcely three quarters of an inch long, yet was most life-like in the details of its construction and its movements, and its warble was perfectly suited in compass to its size. The manufacture of such minute pieces of mechanism is most valuable training for the watchmaker, and they are therefore deserving of encouragement.

United Kingdom.—Considering the vast quantity of toys manufactured in the United Kingdom, the contributions that were exhibited were very inadequate. The only exhibi-

tion of wax dolls that was deserving of notice was one by Augusta Montanari, of Upper Charlotte street, to which a prize medal was awarded. The display of this exhibitor was the most remarkable and beautiful collection of toys in the Great Exhibition. It consisted of a series of dolls representing all ages, from infancy to womanhood, arranged in several family groups, with suitable and elegant model-furniture. These dolls had the hair, eye-lashes, and eyelids separately inserted in the wax, and were, in other respects, modelled with life-like truthfulness. Much skill was also evinced in the variety of expression which was given to these figures in regard of the ages and stations which they were intended to represent. From the prices of these dolls, however, they were adapted rather for the children of the wealthy than for general sale; since the prices of the undressed dolls were from 10*s.* to 105*s.* each; the dressed dolls, which were attired with much taste, were much more expensive, and varied in price according to the richness of the material of which the robes were made. In a small case adjoining that which contained the toys just enumerated, were displayed several rag-dolls, which were very remarkable productions, considering the materials of which they were made. They consisted entirely of textile fabrics, and the dolls, which were intended, and were well adapted for the nursery, were reasonable in price, varying from 6*s.* 6*d.* to 30*s.* per doll, including the dresses. Rocking-horses were exhibited by J. C. Dear; and H. Lucas sent an improvement on the garden-horse, which was made to rock by means of the motion of one of the wheel-axes as the horse was dragged along. A few compressible toys were exhibited, and a variety of automaton and other toys, chiefly foreign, were displayed by A. Bouchet. None of the ordinary strong toys of English manufacture were exhibited, probably on account of the makers of these sorts being generally very poor; for most of the English wooden toys are constructed by chamber-masters, who seldom manufacture goods to order, but, on the contrary, when they have produced a small number, hawk them about from shop to shop, or vend them in the streets. Without capital, and compelled to work almost literally from hand to mouth, they continue to exist only, without any material advance, but making much the same kinds, having the same general degree of merit, one year after another. That this is no exaggeration, must be conceded by every one who will recal to mind the toys of twenty years since, and mentally contrast them with those of the present day. That the progress has been slow, and requires long intervals for comparison to make it apparent, arises from the fact that all the improvements must be made in the few leisure moments of the workmen, who are compelled to labour many hours each day to gain a livelihood, and who, probably, cannot even afford the time to carry out any suggestions which may be made to them. That the poor workman does, nevertheless, endeavour to improve in his productions, is shown by Mr. Dickens, with touching humour, in *The Cricket on the Hearth*, when Caleb is made to say, "You couldn't have the goodness to let me pinch Boxer's tail, mum, for half a moment, could you?" When surprise is expressed at the question, he thus explains his meaning: "Oh, never mind, mum; he mightn't like it, perhaps. There's a small order just come in for barking-dogs, and I should wish to go as close to nature as I could, for sixpence. That's all. Never mind, mum." Dolls'-houses, shops, brewers' drays, waggons, common horses, the body formed of a sort of skittle with a slice cut off on the under side, and four round pins for the legs, are made in large quantities in England. Spades, wheelbarrows, garden-rollers, garden-rakes, skipping-ropes, caouchouc-balls, tops, kites, and similar toys, are also made in great numbers. Wax or composition dolls are made entirely in England, but wooden dolls are imported, as are also papier-mâché dolls' heads, the bodies only being made in this country.

Wurtemburg.—Immense quantities of toys are manufactured in Wurtemburg, more

particularly on the borders of the Black Forest, and are exported to England, America, and other countries. The contributions in the Exhibition comprised most of the kinds which are manufactured in that country; as, for example, mechanical toys by Rock and Graner, of Biberach, some made of tinned iron-plate, and others in papier-mâché, comprising carriages with horses, which were moved by the revolving parts by means of cranks and links; a water-mill, to be acted upon by real water; a cascade and fountain, in which, also, real water was to be used; a working-model of a pump; collections of kitchen utensils, and numerous other articles. A prize medal was adjudged to these exhibitors. The number of exhibitors from all parts was 51; of these there were 12 holders of a prize medal, 2 who obtained honourable mention, and 37 unrewarded.

Having gone our rounds, and visited nearly all the toy-shops of the several nations who contributed towards furnishing the vast variety of objects of interest exhibited in the Crystal Palace, we will now dismiss the subject, and, opening a fresh chapter, return to the agreeable dissertations of our gifted member of the Institute of France.

CHAPTER III.

LETTERS OF M. BLANQUI—*continued.*

LETTER VI.—SPAIN AND TURKEY—FORMER EXCELLENCE OF SPANISH MANUFACTURES—CLOTHS, VALENTIA SILKS—TOLEDO BLADES—KID GLOVES—A DIGRESSION UPON THE FAIR SEX—MINERAL PRODUCE OF SPAIN—TURKISH SPLENDOUR—GREEK MARBLES AND PIGMENTS—TURKISH CARPETS—BURSA SILKS—QUESTION ON THE CORN LAWS—PRAISE OF COBDEN—VISIT TO A FARM IN LANCASHIRE—SMALL AGRICULTURAL STEAM MACHINES—PATRIARCHAL HABITS—ENLIGHTENMENT OF ENGLISH FARMERS—ABOLITION OF PROTECTION—ABUSES IN THE CUSTOM-HOUSE.

Let us in this letter devote ourselves to Spain and Turkey, at the two extremities of Europe. They are in close proximity at the Exhibition, and resemble each other through their decidedly progressing tendency during the last few years. Turkey and Spain are not, as is generally believed, worn-out countries; on the contrary, they are still in their infancy. The real spirit of progress makes in reality more rapid strides here than in other places, which claim to be enlightenment itself, and which oftener spread conflagration than civilization. I have visited Spain and Turkey a few years ago; I met these nations here again, more advanced than ever in the path which had commenced to open before them; and their products merit serious attention, even when placed in juxtaposition with those of the great industrial regions which at the present moment absorb the attention of the world. Spain has for a long period been a brilliant arena in which the manufacturing arts have shone with a splendour, which is striving to revive. Her manufactories of arms, of silks, of woollen cloths, of gold and silversmith's work, of carpets, have occupied an honourable rank in Europe. Her typography was once greatly renowned. Her workmen possessed a rare merit—that of being original without degenerating into the false taste, which for a while ran through their literature. They have borrowed from Arabian traditions a multitude of useful processes and of charming forms, which they have appropriated with a moderation and an intelligence suitable to their times. They have never been insipid or vulgar, even when the flame of their genius seemed likely to be extinguished beneath the passion of fanaticism. They fell with pride or with sadness, as Castilians are wont to fall, ever ready to rise again, and ever worthy

of respect. Their exhibition in London is not on a very large scale. They have shown themselves almost as indifferent here as they habitually are in their national exhibitions, where they have always appeared in very limited numbers,—whether it be that these new festivals of the material world excite less their enthusiasm than those they were wont to celebrate in their temples, or that the distance may have frightened them in consequence of the bad state of their roads. I have already said that they had sent more raw materials than manufactured goods; I am still of this opinion, and I may add that they have done right. Spain is above all a land rich in natural products; and I shall not be doing her any great injustice in stating that her mines, her marbles, her metals, will in the long run tend more to her honour and profit than her woollen and cotton manufactures. But, for all that, the efforts which she is making to enter upon the path of manufacturing labour, at the keenest moment of the struggle which has been entered upon between the European nations, are not the less worthy of honour.

The productions exhibited by Spain are of very good quality. We have particularly noticed blue and black woollen cloths—especially black—which are manufactured from the best wools of the country, and which can sustain the comparison with the corresponding qualities of foreign manufacture. The silk goods of Valentia have likewise maintained their good name, but they leave a good deal to be desired in point of finish, patterns, and even colours. A trial of black lace embroidered with colours has been less happy: this may be an innovation destined to obtain some success in the colonies. Fine and good samples of sail and cable cloths bear testimony to the resumption of the spinning of yarn, which possesses great elements of prosperity in that country. The Spaniards have exhibited few fire-arms, but what there are, are principally from the manufactory at Toledo, the land of good daggers and flexible swords, which enter the body with the pliancy of the serpent. Some pistol cases, and two cannons—one of bronze, the other of iron—the latter, it is said, forged with the hammer by the Carlists during the civil war—complete their collection of destructive implements, which suffices to show of what they are capable in this description of article. Pray to Heaven that they may use their iron for other purposes! This iron is really excellent, and may vie with that of Sweden. There are also in the Spanish exhibition very fine samples of their kid skins for gloves, which I consider to be the softest in the world, and the most worthy to protect ladies' hands. Why have we not likewise in the Spanish gallery some of their admirable women—of those who excite the enthusiasm of great deeds? The fair visitors of the North are so cold, so formal; they look as if they came out of a Presbyterian chapel! Pardon me this digression, Sir, for the ladies are here in the majority, and one would almost believe that it is out of pure gallantry to them that Englishmen have got up the Exhibition. They are indefatigable. They eat like ogres, at all the refreshment stalls. The detestable fashion of *crinoline*, and even of baskets, which has seized upon them, gives them a really fantastic size, which every day diminishes the space left to move about in. It is even something strange and curious to see this exhibition within the Exhibition; but it proves at least that here the women, through their instruction, take a real share in the progress of industry, and that they seriously occupy themselves about the interests and labours of their husbands.

Thus we may see them eagerly grouped, like manufacturers or *savans*, around raw materials arranged with much order and simplicity in the Spanish gallery. They admire the wools of Estremadura, the silks of Valentia, the lead ores, the marbles, and, above all, the preserved fruits of Malaga. This collection is exceedingly beautiful. It is by means of her inexhaustible mineral wealth that Spain will regain her fortune. She will find within her own bowels wherewithal to feed her children. Mineral wealth is now-a-days the starting-point of all others. When a country possesses iron, lead,

sulphur, and even, if I may judge from very fine samples sent by Galicia, tin and copper, it possesses the essential basis of all manufactures. I hope that the glorious land of Spain may not seek elsewhere, to the detriment of her natural fortune, an artificial fortune based on tariffs and prohibitions, which would not restore her manufactures, but which would restore smuggling, to say nothing of pauperism and its attendant train of evils. We may hope the same for Turkey. Turkey now aspires, with much honour to herself, to be ranked among the civilised nations. The young Sultan is endeavouring honestly to follow the footsteps of his father, and he has found in Rechid-Pacha an enlightened counsellor and a determined auxiliary. It is indisputably to their powerful intervention that the success of the Turkish exhibition is attributable. It is really a remarkable one; and even after having visited the celebrated bazaars of Adrianople, of Constantinople, and of Smyrna, I could hardly have expected to find so much diversity of richness and taste as in the articles which have been sent by the Levant. As I pass, I greet the small exhibition of Greece, where we have recognised the classic marbles of Paros, and the honey of Mount Hymet. The posterity of Homer and Pericles have since cultivated the grapes of Corinth, and now cultivate sponges and meerschaum, the latter—forgive it them, O ye gods!—serving to make pipes! As far as I am concerned, I devote all smokers to the infernal gods. Greece has sent some beautiful black marbles and madders equal to those of Cyprus. Gall nuts and dyers' weeds will ere long become elements of wealth for that country, the friend of France, which has always had our sympathy, and whose progress has probably contributed not a little to that of its former masters.

In giving you an account of the Turkish exhibition, I must commence by saying I have been greatly surprised only to find vulgar carpets, strong and almost unchangeable as are nearly all they make, but of an unhappy choice. The Turkish carpets are probably the articles most adapted for barter which come from that country, and care should have been taken only to exhibit those most remarkable in point of pattern and colour. I should not omit to state that on their importation into France they pay exorbitant duties, and that but for this improper protection, these precious fabrics, the consumption of which is almost nil, and which ought to be immense, would long since have come into very extended use in France. It is the importation of Cashmere shawls which has led to the extensive use of French shawls; it is the importation of Turkish carpets which will extend amongst us the use of French carpets. The Turks have arranged their exhibition with much art. It resembles a beautiful bazaar, lighter and more coquettish than their own, in which the goods are displayed after the Eastern fashion. I will not allude to some attempts at printed calicoes, which must not be encouraged, for they are hideous and unpardonable, owing to the advanced state of this branch of industry in less industrial countries; but their light silk goods, their stuffs embroidered with gold, are worthy of attention, even when compared with the analogous productions of British India. The Turks will do much better to devote themselves entirely to the production of raw materials, and above all, of dye-stuffs. Their Bursa silks have a reputation; their madders, their kermes, their sesamums, their rice, their opium, their copper, their skins, will become articles daily more sought after, and with which the industry of Europe cannot dispense. It is useful for them as well as to ourselves, to tell them that they would take a wrong course in neglecting their natural productions, for which they have a certain market, in the pursuit of a more than doubtful manufacturing progress.

It is such lessons as these that the Universal Exhibition will teach to many people. It will prevent capital from flowing to industrial Utopiæ, to divert them to the safer grounds of agriculture and raw materials. If we wished all to manufacture anything

at any price, we should run the risk of wanting the most indispensable raw materials necessary for production, and to perish either through insufficiency or abundance. The English are at present more dependent upon American cotton than upon their own iron. The most characteristic fact of our civilization is the growth of that mutual dependence of nations which is the soundest guarantee of peace. The Turks may judge from the wants which the Exhibition will have revealed to them, the direction which they should give to their reviving industry.

LETTER VII.

I ran away for a few days from the attractions of the Exhibition to go and study on the spot certain questions to which the economical reforms which have been accomplished in this country impart at the present moment peculiar interest. I was desirous of seeing whether the great display of industrial power which England is making in London at the present moment, and the path of commercial freedom on which she has entered since the memorable league of Cobden, were real or delusive symptoms of her social progress. It appeared to me that it was the duty of a political economist not to trust to appearances only, but to examine for himself whether the English people had really been the gainers by all the commercial reforms which have been the result of so fierce and determined a struggle. Has the abolition of the corn-laws been beneficial or injurious to the cultivators of the soil? Have the workmen gained in prosperity what the agriculturists pretend to have lost? Is free-trade likely to be permanent? What are likely to be its ultimate results?

These are grave questions at the present time—I might say questions of life and death—since upon their solution depends the food of the people, and the tranquillity or disturbance of the state. What a bitter disappointment, besides, to us, if we must place amongst the rank of chimeras and utopiæ the lively hopes which have encouraged us in the war which we wage against the prohibitionists—a thankless strife, in which we have so often to encounter the hatred of some, the indifference of others. Happily, the moment is at hand when that sovereign arbiter called experience will pronounce—indeed, we may say, that that moment has already arrived in England. You shall judge of it, and may your readers give to this important letter all the attention which it merits. The following are the simple facts: some years ago, several English manufacturers, struck by the distress of the labouring classes, endeavoured to trace its causes, and speedily discovered that the taxes on raw materials and on alimentary substances were the principal sources of this distress. Taxation in every shape, and particularly in that of the import duty on corn, deprived workmen of a portion of their wages. It was evident that the state and the great landed proprietors divided the amount, entirely defrayed by the industrial classes, between them. Since that period, Mr. Cobden and his friends—for it is they who have conducted this religious crusade to a successful issue—did not say to the operatives, "Let us upset the government and the institutions of our country—let us drive the Queen from her throne, and let us threaten property;" they quietly said, "Your distress is attributable to the corn-laws; let us repeal the corn-laws:" and the corn-laws were repealed. When they had perceived that this abolition would result in a great increase of the prosperity of the country, the promoters of the reform, convinced that the surest means of giving a fresh impetus to British industry, was to ensure the supply of raw materials at the lowest prices, set about with renewed vigour to propagate the happy idea, and to ensure its triumph: it also, in its turn, has triumphed. Then came the turn of the navigation-laws, whose object was to maintain for the English flag the monopoly of conveyance and of maritime supremacy. These laws have likewise disappeared from the statute book.

At present, Englishmen may purchase their grain wherever they please, without paying duty; and they receive raw materials from every part of the globe without taxes or privilege of flag.

Assuredly never was economical reform more radical than this. It attacked at one fell swoop landed property in its income, the state in its financial resources, and the national susceptibility in its most ticklish points. All this has been accomplished, without firing a shot, by the sole power of right and reason; and by perseverance and patience—those two great virtues, alas! so rare among us. But a fierce resistance during the struggle, and a still stronger reaction after success, were things to be expected. This reaction still continues, particularly amongst the agricultural interest; and at the present moment it is complicated by the extreme depreciation in the price of corn. It was, therefore, of great importance to go to the fountain-head, to study this new fact worthy of attention. I went, in company with my learned friend, Michael Chevelier, professor of political economy in the college of France, to one of the most remarkable farms in Lancashire, managed by one of the most distinguished farmers in England. We have found this able agriculturalist firm as a rock in his belief of the future prosperity of agriculture. He only considered the present low price of grain as accidental, owing either to the general abundance of corn throughout Europe, or to other transient causes foreign to the new commercial legislation. He admitted that this reform compelled him to modify his cultivation; and that he had discovered a new mine of wealth in the multiplication of pigs, of which we counted between four and five hundred on his farm. Instead of producing corn, Mr. W—— produced meat; and he did not doubt that the abolition of the corn-laws would open the eyes of a great number of farmers who had slept for so many years on the pillow of protection.

Here the cultivators of the soil might see the difference between their venerable immoveableness and the application of science to agriculture. I had been very much struck, in the Great Industrial Exhibition, with the singular variety of the English agricultural implements, the greater part of which are even unknown to us by name in France. My colleague and myself had had often explained to us to what uses, for instance, might be devoted pretty small agricultural steam-engines of five or six horse-power. We know it now. During the whole of our route we have seen several of these machines in the farm-yards of the villages. They serve to thrash the corn, to chop the grass for the cattle; they are used for ploughing, by being stationed in various parts of the fields, from which they put the ploughs in motion. Mr. W—— does not despair of applying them to a number of other uses; and he was kind enough to put in motion before us two models of machines intended to weed and spade by steam. The latter is really exceedingly ingenious: it is impossible to imitate with greater precision the movement of a man's arms. "Before long," said Mr. W——, "all England will be spaded and raked like my garden."

In order to understand the justness and the probable realisation of this idea, it suffices to observe with some attention the manners of the people of this country. The farmer whose hospitality we enjoyed possesses three thousand acres of land, and lives with a simplicity which is not without grandeur. He lives on the land which he cultivates, he looks after it, and animates all with his example. He causes the smallest portion of solid or liquid manure to be collected with the utmost care. He visits the styes of his numerous pigs, looks after their health, and attends to all their wants. They are his California. Fifteen months suffice to see these useful animals, which yield enormous profits to his farm, born and die. We were greatly surprised at meal-times to see all the male and female domestics coming into the room carrying a wooden bench, which was placed facing the arm-chair of the master of the house

and his family. Mr. W——, seated in his arm-chair, then opened the Bible, out of which some chapter was read, and then all kneeled together. After prayer the domestics took their form with them, and the family commenced their meal. Every one here respects his fellow-man—the masters their servants, and the servants their masters. There is neither familiarity nor haughtiness. On all hands there is little talk, but a great deal of business. Mr. W—— conducted us across the fields over all his grounds. Would that your agricultural friends could make this journey! Here they would see what agriculture is; what an admirable, methodical, and analytical art, replete with charms, agriculture is; how the soil is kept free from extreme wet and extreme drought by means of drainage; how the pulverable manures, such as guano, are deposited by a machine around each grain of corn which is sown in the ground; how the fodder is pressed to avoid fermentation; how hay and straw are mixed, &c. &c. Over immense surfaces of ground, all the plots devoted to special culture are enclosed in; everywhere there are small wooden or iron barriers, well closed by means of ingenious and economical latches; double-sided mangers, racks, stables, cattle-sheds, and dairies, of admirable cleanliness, the windows of which are cleaned every day. People *condescend* to reside here, sir; they know how to draw profit and happiness from the fields, and the fields are not unjust. The truth is, with us Paris is everything; we are nailed to it by the two most irresistible influences—those of politics and of women—may heaven forgive them! But I trust there are yet good days in store for agriculture, and that the republic will render the residence of towns so hateful, that we shall be compelled to go for peace and soft emotions to the country.

Another trait of English manners is, that the greater part of the men who are engaged in agricultural pursuits are generally instructed and enlightened in all matters of political economy. Mr. W—— possesses not only a rare collection of agricultural implements, but also an excellent library. All the farmers in this country are acquainted with the progress of chemistry or botany, of mechanical science, and of horticulture. They will therefore have less difficulty in emerging from the torpor in which the corn-laws have plunged them, inasmuch as they will only have to bring forward in the present reign of competition that knowledge which, under the past reign of protection, they suffered too often to slumber. The inevitable results of the abolition of the corn-laws would appear to be further applications of science to agriculture, or a diminution in the rents of the landed proprietors. That portion of the rents, which was levied by means of the corn-law upon the wages of the operative, will be reduced, to the benefit of the farmer; and perhaps the latter, discovering new processes to augment the profits derived from the land, will be able to pay the same rent as heretofore. In that case, nobody would be a loser by the change, and the benefits of cheap living would be opened to the working classes without diminution in the incomes of the landlords. Mr. W—— expressed the idea ingeniously by saying, "We shall turn our land and our brains to better account, that's all; and it is free-trade which will have accomplished the prodigies." Thus, experience proves every day that the abolition of the bread tax will only further have developed the productive powers of this country. The working classes who have become larger consumers, owing to their ability of living cheaply, react on agricultural productions by larger demands. They consume more meat, cheese, milk, butter, vegetables, simply for the reason that they can buy their bread cheaper. In future, only a portion of the corn will be drawn from foreign sources, in exchange for English goods, and England will supply the remainder. Do not laugh at these vulgar expressions and material details—humanity *lives upon good soup, and not on fine words*, even according to Molière, and the prohibitionists would be only too glad to put us on bread and water, if they found it to their interest to do so.

You may, therefore, consider it as a certainty that the cause of freedom of commerce is permanently won in England, and that all the attempts of the protectionist system will not prevail against it. There remain doubtless some abuses to be destroyed in the customs' department; and it is a notorious fact that the vexatious habits of this regime have survived the liberal modifications of the new English commercial policy; but the house of commons has appointed a committee of inquiry to put an end to them, and I have been given to understand, by the chairman of this committee himself, that this inquiry will be conducted in the most liberal spirit. The scandalous reign of espionage, of searching the person, of breaking open packages, of impertinent curiosity, is well nigh drawing to a close. These acts of plunder, known under the name of pre-emption, of seizures, of rewards to informers, will ere long cease to dishonour the legislation of nations, to go and join all other seignorial rights. It is time that a vessel running on our coast—that a father returning to his family—that a merchant who brings wealth to his country—shall cease to be received by armed tax-gatherers, who are permitted to pry into the most secret parts of our baggage. Only think, sir, that we suffer these outrages for such a length of time—not in the interest of the state, which has a right to all our sacrifices, but simply for the purpose of ensuring to some bigoted manufacturers the faculty of selling us their goods without competition.

There is only one opinion in Liverpool against these remains of commercial barbarism, and nevertheless the custom-house regulations are less vexatious there than in our ports. The ardent life of commerce will no longer tolerate these trammels of the past. There arrive at Liverpool about a hundred vessels daily from all parts of the globe; there are always five or six hundred loading. The railways send forth with the rapidity of lightning in every direction trains loaded with passengers, and I close this letter at a distance of ninety leagues from London, where I should be in five hours did I not intend to stop a day at Manchester. What can be opposed to such torrents? The present customs system will disappear; not because it is absurd, but because it is impossible. My honourable colleague of the Institute, M. Léon Faucher, Minister of the Interior, has first delivered us from the tyranny of passports. Should he become minister of finance, he will have a fine opportunity to put an end to the custom-house abuses. It would suffice to make his name go down gloriously to posterity.

CHAPTER IV.

FURS AND FEATHERS.

REMARKS ON DRESS—ANTIQUITY OF FUR-CLOTHING—NICHOLAY AND SON—ORIGIN OF THE FUR-TRADE—HUDSON'S BAY COMPANY—ITS VAST TERRITORY—THE NORTH-WEST TRADER—THE INDIAN HUNTER—GREAT VARIETY OF FUR-CLAD ANIMALS—NUMBER OF EXHIBITORS OF FURS—NORTH AMERICA—THE ARCTIC REGIONS—EUROPEAN FURS—TROPICAL SPECIMENS—FEATHERS—MESSRS. ADCOCK AND CO.—OSTRICH FEATHERS—THE MARABOUT STORK—THE GREBE—EIDER-DOWN—SWAN'S-DOWN—GOOSE-DOWN—THE DUCK-BILLED PLATYPUS—CAPE BIRDS—HERON PLUMES—BIRD OF PARADISE FEATHERS.

Personal attire, or dress, has always been held in high estimation in all countries, and among all classes of people. From the rude savage to the polished denizen of the modern drawing-room, all own its influence, and all pay obedience to its laws.

Nature herself, indeed, furnishes us with an excuse for doing so, in the gay and rich attire which she has so lavishly bestowed upon the various objects of her care, "the lilies toil not, neither do they spin;" the birds of the air and the beasts of the field receive from the same bounteous hand their rich and appropriate clothing. Why therefore should not man imitate the example before him, and in his dress endeavour to unite the qualities of grace and beauty with those of mere utility and convenience? It is only when the love of dress amounts to a passion, as we are afraid it sometimes does in the bosoms of the fairer portion of our race, the gentle partners of our firesides, that we would deprecate its influence. Pope presents us with a glowing description of one of these votaries of fashion, in his celebrated *Rape of the Lock*, which we shall quote for the edification, but by no means for the imitation of our fair readers—

"And now unveiled the toilet stands displayed,
Each silver vase in mystic order laid.
First robed in white, the nymph intent, adores,
With head uncovered, the cosmetic powers.
A heavenly image in the glass appears,—
To that she bends, to that her eyes she rears,
Th' inferior priestess, at her altar's side,
Trembling, begins the sacred rites of pride:
Unnumbered treasures ope at once, and here
The various offerings of the world appear;
From each she nicely culls with curious toil,
And decks the goddess with the glittering spoil.
This casket India's glowing gems unlocks,
And all Arabia breathes from yonder box."

But we must terminate our exordium, and introduce our readers to the subject-matter of the present chapter, which, as stated at the commencement, is relative to fur, and chiefly as an article of dress.

As an article of clothing, the fur of animals was naturally and necessarily the very earliest in use among mankind; and we find that our first parents, when driven out of Paradise, had garments made of the skins of beasts. We next read of their use in the adorning of the holy temple; the goat skins dyed red, and the badger skins being particularly pointed out. The Persians, Greeks, and Romans were familiar with the use of furs as articles of clothing and trophies of victory, and imputed in many instances similar customs and usages to their numerous fabled deities and heroes. Equally ancient was the use of the dressed skins of animals amongst the Assyrians, as is proved by the representations on the recently-discovered interesting and valuable sculptures lately rescued from oblivion, and bringing again to light the records of a great nation and mighty people, whose history otherwise might have been lost to us for ever. When we refer to more modern times, we find that the regal miniver encircles the royal diadem and composes the mantle by which the sovereign on state occasions is distinguished, and that the various degrees in rank of our nobility are also known by the heraldic arrangements of the ermine worn by them on their robes of state. In like manner the sable is used, according to the rank, to adorn the official dresses of our civic magistrates. The ermine, again, emblem in the olden time of purity, is worn by the judges, and was, possibly for that reason, chosen as the adornment of their magisterial vestments. The rude Laplander, the uncultivated Esquimaux, and the wild Indian, in their several remote and inhospitable regions, have several marks of distinction peculiar to themselves.

Perhaps the most attractive, and certainly the most artistically arranged collection of furs in the Great Exhibition was that shown by the Messrs. Nicholay and Son, of Oxford-street. Messrs. Nicholay exhibited specimens of almost every variety of fur adapted to male and female habiliment. The beautiful lustre of the seal-skin, dyed and

undyed, was shown to advantage in mantles, *pardessus,* children's dresses, bonnets, coats, and waistcoats—the latter invaluable for winter wear, as a preservation against bronchial affections. In the case of these latter, as in that of the buffalo-skin railway-wrapper, great durability compensates for a trifling increased outlay in the first instance. The historical miniver may be seen in a great variety of muffs and tippets, with spots made with the paws of the Astracan lamb, to suit the requirements of modern taste. A very curious article in this valuable collection was a coat from the hide of a Tartar colt, but so carefully dressed as to be as soft as seal-skin, and, from the fineness and density of the hair, completely impervious to wet. It is not a little curious to find the skin in which a wild Tartar colt once scampered over his native steppes serving, perhaps, as a paletot to some tranquil commercial gentleman economically travelling in an English second-class railway-carriage. The beaver was also exhibited in a great variety of ladies' articles. Formerly the use of this fur in the manufacture of hats rendered it so dear, as to make it quite unapproachable for any other purpose; but since the great "gossamer" revolution, the market has become much more easy, and the manufacture has been in a great measure handed over to the furrier. It dresses beautifully, has fine colour and lustre, and the density of the pile gives it a very rich and costly appearance. But it is not only the skins of wild animals alone that the furrier applies to the purposes of his trade. In this collection were exhibited some beautiful articles in the skin of the grebe, a wild duck found near the lake of Geneva, and a very costly and beautiful suit made from the feathers of the egret, a small bird, and so rare and expensive as only to be attainable by royal wearers. This costly collection was completed by various specimens of wolves, tigers, &c., carefully stuffed, and adding greatly to the attractiveness of the stand. Her Majesty visited Mr. Nicholay's stand more than once, and commended many of the articles. A visit to that portion of the nave in which the British fur-trade arranged its wares must have convinced the most sceptical that our English furriers, having the command of the best market for the selection of skins, have also attained the greatest perfection in dressing these costly and beautiful articles of costume. It may be necessary to remind the reader, that the greater portion of the more costly furs is supplied by the Hudson's Bay Company and the North American Company, both of which have their hunting-grounds in the most northern part of the American continent, and who bring the produce to London, where, on sales occurring twice or three times a-year, the furriers of the whole world, Russia among the rest, supply themselves; and it is but reasonable to suppose that the London furriers, residing on the spot, and having the wealthiest people in the world for their customers, would not be behind any in the preparation of articles of the greatest costliness and beauty. To prove that such is actually the fact, it is only necessary to examine the specimens of the skins of almost every animal, from the royal lion and Bengal tiger down to the domestic rabbit, from which the fur section in the Crystal Palace was profusely filled. The greatest show in quantity, and surpassed by none in quality, was that of Messrs. Nicholay, who hung the whole front of the gallery with the skins of lions, tigers, bears, wolves, and foxes, dressed to a beautiful softness, and adapted to a modern exigency by being formed into open carriage, sleigh, and railway wrappers. It appears that they surpass all other articles of that description in warmth and comfort, and, although considerably more expensive than woollen wrappers in the first instance, yet, from their great durability, they become eventually the most economical wrapper for any one who travels much by open carriage or rail. Several specimens of the royal ermine were to be found in Messrs. Nicholay's stall. In the reign of Edward III. ermine and lettice were forbidden to be worn by civilians, and other expensive furs were permitted only to knights and ladies whose incomes exceeded four hundred marks annually. Richard III. and his queen, Anne,

rode from the Tower to Westminster in robes of velvet, faced with ermine, on the day of their coronation.

The fur trade between Europe and America commenced early in the seventeenth century, and was carried on by the early French emigrants. Quebec and Montreal were at first trading posts. The trade was then, as now, a barter of guns, cloth, ammunition, &c., for the beaver and other furs collected by the natives, and was effected by the intervention of the *voyageurs, engagés,* or *coureurs des bois.* These men carried burdens on their backs to the Indian camps, and exchanged their wares for peltries, with which they returned in the same manner. Shortly after the discovery of the Mississippi, permanent houses, and in many places stockade forts, were built, and men of capital engaged in the trade. Detroit, Mackinac, and Green Bay, were settled in this manner. In 1670, shortly after the restoration of Charles II., that monarch granted to Prince Rupert and others, a charter, empowering them to trade, exclusively, with the aborigines in and about Hudson's Bay. A company, then and after called the Hudson's Bay Company, was formed in consequence. The trade was then more lucrative than at present. In the winter of 1783–4, another company was formed at Montreal, called the North-West Fur Company, which disputed the right of the Hudson's Bay, and actively opposed it. The Earl of Selkirk was at that time at the head of the Hudson's Bay, and conceived the plan of planting a colony on the Red River of Lake Winnepeg. Of this colony the North-West Company was suspicious. In consequence of this, and the evil feelings naturally growing out of a contrariety of interest, a war ensued between the servants of the parties, and a loose was given to outrage and barbarity. Wearied, at last, in 1821 the companies united, and are now known by the name of the Hudson's Bay Fur Company. The colony established by Lord Selkirk soon broke up, the settlers going to the United States. Few are aware of the extent of the territory of the Hudson's Bay Company. It covers one-eighth of the habitable globe. Russia comes next in order of importance in this respect, but the race of animals is different.

Of all who have traded with the aborigines, the French were the most popular and successful. They did, and still do, conform to the manners and feelings of the Indians better than the English and Americans ever could. Most of the persons now engaged in the fur trade, in the region north of the Missouri, are French; and they are much esteemed by the natives, with whom they frequently intermarry. The male offspring of these alliances are commonly employed as interpreters, *engagés,* &c. They are handsome, athletic men. Mixing the blood seems to improve the races. The Indian trade on the great lakes and the Upper Mississippi, with its branches, has long been in possession of the North American Fur Company, the principal directors of which are in the city of New York. In the year 1822 a new company, entitled the Columbian Fur Company, was organised to trade on the St. Peter's and Mississippi. It was projected by three individuals, who had been thrown out of employment by the union of the Hudson's Bay and North-west, as before-mentioned. Its operations soon extended to the Missouri, whither its members went from the sources of the St. Peter's, with carts and waggons, drawn by dogs. When it had, after three years' opposition, obtained a secure footing in the country, it joined with the North American. There was another company on the Missouri at the same time. Furs were also obtained from the Upper Missouri and the Rocky Mountains as follows: Large bodies of men (under the pretence of trading with Indians, to avoid the provisions of the law,) were sent from St. Louis, provided with traps, guns, and all things necessary to hunters and trappers. They travelled in bodies of from 50 to 200, by way of security against the attacks of the savages, till they arrived at the place of their destination, when they separated, and pursued the fur-clad animals singly, or in small parties. When their object was effected, they assembled with their

peltry, and descended the Missouri. They did not always invade the privileges of the natives with impunity, but sometimes suffered severely in life and property. This system still continues, and its operatives form a distinct class in the state of Missouri. The articles used in the Indian trade are chiefly these: coarse blue and red cloth and fine scarlet, guns, knives, blankets, traps, coarse cottons, powder and ball, hoes, hatchets, beads, vermillion, ribbons, kettles, &c.

The course of a trader in the North-west is this: He starts from Michilimackinac, or St. Louis, late in the summer, with a Mackinac boat, laden with goods. He takes with him an interpreter, commonly a half breed, and four or five *engagés*. On his arrival at his wintering ground, his men build a store for the goods, an apartment for him, and another for themselves. These buildings are of rough logs, plastered with mud, and roofed with ash or linden slabs. The chimneys are of clay. Though rude in appearance, there is much comfort in them. This done, the trader gives a great portion of his merchandise to the Indians on credit. It is expected that the debtor will pay in the following spring, though, as many neglect this part of the business, the trader is compelled to rate his goods very high. Thus the honest pay for the dishonest. Ardent spirits were never much used among the remote tribes. It is only on the frontier, in the immediate vicinity of the white settlers, that the Indians get enough to do them physical injury, though in the interior the traders, in the heat of opposition, employ strong liquors to induce the savages to commit outrage, or to defraud their creditors. By this means the moral principle of the aborigines is overcome, and often destroyed. Spirit is commonly introduced into their country in the form of high wines, they being less bulky, and easier of transportation than liquors of lower proof. Indians, after having once tasted, become extravagantly fond of them, and will make any sacrifice, or commit any crime, to obtain them. Those Indians who have substituted articles of European manufacture, for their primitive arms and vestments, are wholly dependent on the whites for the means of life, and an embargo on the trade is the greatest evil that can befal them. It is not going too far to say that the fur trade demoralises all engaged in it. The way in which it operates on the Indians has been already partially explained. As to the traders, they are, generally, ignorant men, in whose breasts interest overcomes religion and morals. As they are beyond the reach of the law (at least in the remote regions), they disregard it, and often commit or instigate actions that they would blush to avow in civilised society. In consequence of the fur trade, the buffalo has receded hundreds of miles beyond his former haunts. Formerly, an Indian killed a buffalo, made garments of the skin, and fed on the flesh while it lasted. Now, he finds that a blanket is lighter and more convenient than the buffalo robe, and kills two or three animals, with whose skins he may purchase it. To procure a gun, he must kill ten. The same cause operates to destroy the other animals. Some few tribes, the Ottaways, for example, hunt on the different parts of their domains alternately, and so preserve the game. But by far the greater part of the aborigines have no such regulation. The fur-clad animals are now to be found in abundance only in the far north, where the rigour of the climate and the difficulty of transportation prevent the free access of the traders, and on the Upper Missouri, and towards the Rocky Mountains.

The first proposal as to the exhibition of furs was, that it should be a joint affair amongst the merchants, wholesale dealers, and retailers—a shape in which (although four of the leading houses in the trade contributed to the great case in the centre of the western nave, which went by the name of the Fur Trophy) the project did not get carried out; the wholesale dealers at first hanging back, under the impression that though furs might be shown of every class, and in every stage of finish, they scarce sufficiently formed an article of manufacture for exhibition: finally, however, nearly all

dropped in, it being felt that a branch of trade occupying so large an amount of capital, and employing such a number of hands, should be fairly represented; and, therefore, in the wholesale trade, Messrs. George Smith and Sons, of Watling-street; Robert Clark and Sons, Cheapside; Bevingtons and Morris, King William-street; Lutze and Co., King Edward-street; Myer and Co., Bow-lane; and George Ellis, Fore-street; and in the retail, Nicholay and Son, Oxford-street; R. Drake, Piccadilly; Ince and Son, Oxford-street, became exhibitors in the common case or in spaces of their own. The skins and furs from the Arctic regions, sent by the Hudson's Bay Company, selected from their importation of 1851, and prepared and arranged by Messrs. J. A. Nicholay and Son, her Majesty's furriers, were of great value, beauty, and interest. The groups of the varieties of foxes included the black, silver, cross, red, blue, white, and kitt. The black and silver fox is the most valuable of this tribe —a single skin bringing from ten to forty guineas; they are generally purchased for the Russian and Chinese markets, being highly prized in those countries. The cross and red fox are used by the Chinese, Greeks, Persians, &c., for cloak linings and for trimming their dresses. The white and blue fox are used in this and other countries for ladies' wear. In the sumptuary laws passed in the reign of Henry III. the fox is named, with other furs, as being then in use. It has been stated that the fox in the Arctic regions changes the colour of its fur with the change of the seasons. Such however is, we believe, not the case, with the exception of the white fox, which is in winter a pure white, and in summer of a greyish tint. Among other groups shown were beautiful specimens of the otter (*Lutra Canadensis*). The Hudson's Bay, North American, and European otters are chiefly exported for the use of the Russians, Chinese, and Greeks, for caps, collars, trimmings, robes, &c. It may not be uninteresting to state, that upwards of 500 otters, the produce of this country alone, were exported during the last year. Near to these was a beautiful and interesting group of beavers (*Castor Americanus*). The beaver, in former years, was one of the Hudson's Bay Company's most valuable productions; but since its use has been almost entirely discontinued in the manufacture of hats, it has lost much of its value. Experiments have, however, been made, and are progressing satisfactorily, to adapt its fine and silky wool to weaving purposes. For ladies' wear, a most beautiful fur has been the result of preparing the beaver by a new process, after which the surface is cut by an ingenious and costly machine. It is exported in its prepared state for the use of the higher classes in Europe and the East. The rich white wool from the under part of the beaver brings at the present time a very high price, and is, we believe, largely exported to France, where it is manufactured into a beautiful description of bonnets. Passing from the beavers, we came to two groups, one of the lynx (*felis Canadensis*), the other of the lynx cat (*felis rufa*), both of which, when dyed, were formerly much used. Their rich, silky, and glossy appearance justly caused them to be great favourites; but the caprice of fashion at length banished them from this country. They are, however, still dyed, prepared, and exported in large numbers for the American market, where they are much admired. In its natural state the fur is a greyish-white, with dark spots, and it is much used by the Chinese, Greeks, Persians, and others, for cloaks, linings, &c., for which purposes it is very appropriate, being exceedingly warm, soft, and light. The lynx of the present day is the fur formerly called the "lucern."

We had next groups of the wolf (*canis occidentalis*); of the fisher (*mustela Canadensis*); of the wolverin (*gulo luscus*). The wolves' skins are generally used as cloak and coat linings in Russia and other cold countries, by those who cannot afford the more choice kinds; also for sleigh coverings and open travelling carriages. The other skins enumerated are principally used for trimmings, &c. The tail of the *canis occidentalis* is very valuable, and is exclusively used by the Hebrew race on the Continent. The North

American badger, of which some fine specimens were shown, is exported for general wear; its soft fine fur rendering it suitable for that purpose. The European badger, on the contrary, from the wiry nature of its hair, is extensively used for the manufacture of the superior kinds of shaving-brushes. The Hudson's Bay martin or sable (*mustela martes*), is principally used for ladies' wear, and is next in repute and value to the Russian sable. It is consumed in large quantities in this country, in France, and in Germany. The darkest colours are the most valuable, and the lighter shades are frequently dyed to imitate the darker varieties. The heraldic associations connected with the sable render it highly interesting to the historian and the antiquary. In every age it has been highly prized. The lining of a mantle, made of black sables with white spots, and presented by the Bishop of Lincoln to Henry I., was valued at £100, a great sum in those days. In the reign of Henry VIII. a sumptuary law confined the use of the fur of sables to the nobility above the rank of viscounts. The minx (*mustela vison*), is exclusively the produce of the Hudson's Bay Company's possessions, and other parts of North America. It is consumed in Europe in immense quantities, principally for ladies' wear; its rich, glossy appearance, and dark brown colour (similar to sable), combined with its durability and moderate cost, justly render it a great favourite.

The musquash, or large American musk rat, is imported into this country in immense numbers; it was formerly used much in the manufacture of hats, but the introduction of the silk hat has entirely superseded it. The musquash is now dressed in a superior way, and is manufactured extensively for female wear, both in its natural and dyed state. It is a cheap, durable, and good-looking fur. This humble article has, we believe, been introduced to the public under every name but its real one, and thousands who use it are led to believe that they are possessed of sable, minx, and other real furs. The white hare (*lepus glacialis*), from the Polish regions, and also from Russia, is perfectly white in winter, but in summer it changes to a greyish tint. The skins being exceedingly tender, it has latterly given place to the white Polish rabbit, which is more durable, and therefore more suitable for that purpose. When dyed, it looks exceedingly rich and beautiful, and is often palmed off upon the inexperienced for superior furs. The Hudson's Bay rabbit is one of the least valuable skins imported by the company. Like all furs from the polar regions, it is fine, long, and thick, but the skin is so fragile and tender, that it is almost useless; it is, however, dyed and manufactured for ladies' wear, and is sold by many dealers, we believe, under various names, and even frequently as sable; but, to the great annoyance of the purchasers, it soon breaks, the fur rubs off, and it falls to pieces. The large North American black bear is termed the "army bear," because its fur is generally used in this and other countries for military purposes, for caps, pistol holsters, rugs, carriage hammercloths, sleigh coverings, and accompaniments. The fine black cub bears are much sought after in Russia for making shube linings, coat linings, trimmings and facings; the other sorts, with the large grey bears, for sleigh coverings, &c. The skin of the white Polar bear, the supply of which is very limited, is generally made into rugs, which are often bordered with that of the black and grey bear. The brown Isabella bear is at the present time used for ladies' wear in America. Forty years since, the Isabella bear was the most fashionable fur in England—a single skin producing from thirty to forty guineas; but the caprice of fashion causes similar skins at the present time to produce not more than as many shillings Near the group of bears was a small and valuable collection of the skins of the sea otter (*eutrydra maritima*). This animal is mostly sought after by traders on account of its value—a single skin producing from thirty to forty guineas. It is said to be the royal fur of China, and is much used by the great officers of state, mandarins, &c. It is in great esteem in Russia, and is principally worn by the nobles, for collars, cuffs, facings, trimmings, &c. On account

of its great weight, it is rarely used by ladies. Among North American and Canadian skins, Messrs. Nicholay and Son exhibited likewise a group of racoon (*procyon lator*). The finest qualities of racoon are, we believe, produced in North America, and are imported into this country in immense numbers. They are purchased here by merchants who attend the periodical fur sales, and who dispose of large quantities at the great fair at Leipsic. They are principally used in Russia and throughout Germany, for lining shubes and coats, and are exclusively confined to gentlemen's wear. The dark skins are the choicest, and are very valuable. We had next a group of cat lynx (*felis rufa*). This animal is mostly found in Canada, and is a distinct variety of the lynx species; the skins are exported, and are made into cloak and coat linings, being very suitable for cold climates, and very moderate in price. The North American minx is found in great numbers in Newfoundland, Labrador, the Canadas, &c., and is the finest of the species. Several most excellent specimens of this skin were shown. Some furs of the Virginian or North American grey fox completed the collection of the produce of the Canadas, Newfoundland, and Labrador. This fur is at present used to a considerable extent for open carriage wrappers, sleigh wrappers, coat and cloak linings, also for fur travelling bags, foot muffs, &c. Its exceedingly moderate price, warmth, and great durability, render it an especial favourite.

We now propose to notice the European furs. Foremost in interest among those was a group of Russian sables (*martes zibellina*). This is one of the most costly furs, a single skin varying in price from three to ten guineas. It is usually manufactured into linings, which are generally used as presents by the Emperor of Russia, the Sultan, and other great potentates, being of the value of one thousand guineas and upwards. They are also manufactured for ladies' and gentlemen's wear, according to the prevailing fashion of the country. The Lord Mayor, Aldermen, and Sheriffs of the city of London, have their robes and gowns furred with the sable, according to their respective ranks. The tail of the sable is also used in the manufacture of artists' pencils or brushes, being superior to all others. The tail of the sable makes very beautiful trimmings, which, together with muffs and boas of the same, are much prized. Russia produces about 25,000 of these valuable and admired skins annually. Naturalists have not yet decided whether this species is identical with that from North America—the fur of the former being much softer, finer, and longer than that of the latter.

The stone martin (*martes albogularis*), of which several groups were exhibited, is widely spread over Europe, and derives its name from the fact of the animal selecting rocks, ruined castles, &c., as its haunts. The fur in its natural state is soft and fine, and shades from a light to a dark-bluish grey, taking the colour of the rocks amongst which it is found. The throat is invariably a pure white. The French excel in dyeing this fur, and it is in consequence termed French sable; it is extensively used in this country, and being a permanent colour, and much like the true sable, it is a great favourite. Several groups of baum (or tree) martin (*martes abietum*), were also shown. This fur derives its name from the fact of the animal being invariably found in woods and pine forests. The fur in its natural state is similar to the North American sable, but coarser. It is distinguished by the bright yellow colour of the throat: when dyed, it is so like the real sable, that it can scarcely be distinguished from it.

The groups of ermine (*mustela erminæ*), in their natural state, next demand notice. The ermine is obtained in most countries; but the best is from Russia, Sweden, and Norway. The animal is killed in the winter, when the fur is pure white (except the tail, with its jet-black tip), it being in that season in its greatest perfection; in summer and spring it is grey, and of little or no value. It is the weasel of more southern climes. The ermine is the royal fur of most countries. In England, at the coronation of the

sovereign, the minever, as the ermine is styled in heraldic language, is used, being powdered, that is, studded with black spots; the spots, or powdered bars, on the minever capes of the peers and peeresses, being in rows, and the number of rows or bars denoting their various degrees of rank. The sovereign and the members of the royal family have the minever of the coronation robes powdered all over, a black spot being inserted in about every square inch of the fur. The crown is also adorned with a band of minever, with a single row of spots; the coronets of the peers and peeresses having a similar decoration. The black spots are made of the skin of the black Astracan lamb. On state occasions, in the House of Lords, the peers are arrayed in their robes of state, of scarlet cloth and gold lace, with bars or rows of pure minever, more or less according to their degree of rank; the sovereign alone wearing the royal minever, powdered all over. The judges, in their robes of office, are clad in scarlet and pure ermine. The ermine, with the tail of the animal inserted therein, is used as articles of dress for ladies, in every variety of form and shape, according to the dictates of fashion, and also as cloak linings. The minever can only be worn on state occasions by those who, by their rank, are entitled to its use. In the reign of Edward the Third, furs of ermine were strictly forbidden to be worn by any but the royal family; and its general use is prohibited in Austria at the present time. In mercantile transactions the ermine is always sold by the *timber,* which consists of forty skins. The minever fur of the olden time was taken from the white belly of the grey squirrel. The Kolinski (*mustela Siberica*), or Tartar sable, is procured from Russia; it belongs to the weasel tribe, and is in colour a bright yellow: it is much used in its natural state, and is also dyed to imitate the cheaper sables. The fur which is probably more extensively used in this country than any other, is that of the squirrel (*sciurus*). The squirrel abounds in Russia (where the fur attains the greatest perfection), in such immense numbers as would appear almost incredible—the importation from thence to this country alone, last year, exceeding two millions. It is manufactured entirely for ladies' and children's wear: for cloak and mantle linings it is particularly suitable, its moderate cost adapting it to general use. The celebrated Weisenfels linings deserve a remark here, being made from the belly or white part of the dark blue squirrel. The exquisite workmanship and lightness of this article are without parallel, a full-sized cloak-lining weighing only twenty-five ounces. This favourite commodity is known as the *petit gris.* For colder climates the linings are made from the back or plain grey part of the squirrel, the best having part of the tail left on each skin. The lighter colours have lately been dyed, and introduced to imitate the expensive sables. The squirrel tail is made into the round boa and trimmings, purposely for the foreign market; it is also used for artists' pencils. We find the squirrel named in the sumptuary laws, in the reign of Henry III., and at the same period the minever fur was the white part of the squirrel's belly. Russia produces about 23,000,000 annually.

The fitch or pole-cat (*putorius fœtidus*) is also so well known as to need but little description. About forty years since it was one of the most fashionable furs; the richness of its colour (the top hair a jet black, the ground a rich yellow), combined with its durability, caused a great consumption of this skin; but its peculiar odour, from which it is called the *foulmarte,* has probably been the cause of its gradual disuse. It is produced in the greatest perfection in this country. Of lambskins there were various specimens, including those from Crimea, the Ukraine, Astracan, with Persian, Spanish, Hungarian, and English. The grey and black Russian lamb is mostly used for gentlemen's cloak and coat linings, for facings, collars, caps, &c., and also for army purposes. The Astracan lamb has a rich wavy, glossy, black skin, extremely short in the fur, having the appearance of beautiful watered silk: in order to obtain this choice skin, the parent

sheep is destroyed a certain time before the birth of the lamb. The Persian grey and black lamb is covered with the minutest curls possible; this is not a natural growth, but is caused by the animal being, as soon as born, sewed up tightly in a leathern skin, which prevents the curl from expanding, and which is not removed till the desired curl is produced; from the means adopted, both sorts are rather costly, and they are used for gentlemen's wear and military purposes. The Hungarian lamb is produced in that country in immense numbers; the national coat, called the Juhasz Bunda, is made of it. In the summer or in wet weather the fur or woolly part is worn outside; in winter when warmth is required, it is reversed. The skin is tanned or dressed in a way peculiar to the country, and decorated and embroidered in accordance with the means and taste of the wearer. In Spain, the lamb is used for the well-known and characteristic short jacket of that country, which is adorned with filagree silver buttons; the coarse kinds of both colours are used for our cavalry, and they are also employed for mounting and bordering skins, as leopards, tigers, &c., for ornamental and domestic purposes. In the reign of Richard II., the sergeant-at-law wore a robe furred inside with white lambskin and a cape of the same. The furs of the perewaitzki and of the hampster, which are obtained from Russia, are principally used by ladies; the latter is made into cloak linings, which are exceedingly light, durable, and cheap.

Passing from these, we next come to the skin of that well-known and useful domestic animal, the cat. The cat, when properly attended to, and bred purposely for its skin, gives a most useful and durable fur. In Holland it is bred and kept in a confined state till the fur attains its greatest perfection, and it is fed entirely on fish. In other countries, and especially our own, it is produced in large numbers. The wild cat is much larger, and longer in the fur, and it is met with in extensive forests, particularly in Hungary; the colour is grey, spotted with black, and its softness and durability render it suitable for cloak and coat linings, for which purpose it is much used. The black species is also much in request, and is similarly used, and, with the spotted and striped varieties, it is made into wrappers for open carriages, sleigh coverings, and railway travelling. The value of this skin, and its extensive consumption, have, no doubt, been the cause of the disappearance of many a sleek and favourite "tabby," and we would recommend those of our readers who are in possession of a pet of this description to keep careful watch and ward over it. We understand that the market is rapidly increasing, and the operation of the laws of supply and demand has led to the formation of an unprincipled class, who ruthlessly poach upon these domestic preserves.

We next come to the English rabbit, which yields a most valuable and extensively used fur—both in its wild and its domestic state; and the supply may be said to be inexhaustible. It was formerly employed to make the felt bodies, or foundation, of the beaver hat; but at present, not being used for that purpose, it is dressed, dyed, and manufactured in immense quantities into various useful cheap articles. The wool has recently been used in making a peculiar cloth, adapted for ladies' wear. The English silver grey rabbit was originally a breed peculiar to Lincolnshire, where great attention was paid to it. Warrens of this species have since been formed in various parts of the country. It is in great demand in China and Russia, to which countries it is largely exported, on account of the high price there obtained. The white Polish rabbit is a breed peculiar to that country, and the skin is there made into linings for ladies' cloaks, being the cheapest and most useful article available for that purpose. It is imported in great numbers into this country. The finer sorts of white rabbit are much used as substitutes for ermine; and when the real ermine tails are inserted therein, the imitation is so perfect that it requires the practised eye of the furrier to detect the imposition. So late as the reign of Henry VIII. great value was attached to the cony or rabbit skin, and the charter

of the Skinner's Company shows that they were worn by nobles and gentlemen. Acts of parliament were passed, regulating their sale and exportation, which are still unrepealed, though in abeyance. Several fine specimens of seal skin were contributed by Messrs. Nicholay and Son. The fur seal, the supply of which is small compared with other kinds, is brought to a degree of high perfection in this country; when divested of the long coarse hair, which protects it in its native element, there remains the rich, curly, silky, yellowish down, in which state it was formerly used for travelling caps and other purposes. It is now seldom made use of in this state, but is dyed a beautiful Vandyck brown, giving it the appearance of the richest velvet; and it is manufactured in every variety of shape and form, into articles of dress for ladies', gentlemen's, and children's wear. Passing from the seal skins, we next observed several groups of chinchilla. The chinchilla is exclusively a South American animal. Since its introduction into this country and France, about forty years since, it has continued to be a favourite and fashionable fur. Its extreme softness and delicacy confine it to ladies' wear. It has lately been largely exported from this country to Russia and Germany, where it is greatly admired. The bastard or Lima chinchilla is a short poor fur, altogether very inferior to the other, but often, to those who are not judges, substituted for the superior kinds.

Leaving the northern latitudes and the New World, let us direct our attention to the skins from the tropics, such as lions, tigers, leopards, panthers, &c., several fine specimens of which were shown in the Indian department, as well as by individual exhibitors. In China, the mandarins cover the seats of justice with the skin of the tiger. In this country, the use of the leopard's skin under the officers' saddles is a mark of military rank adopted in some of her Majesty's cavalry regiments. In Austria the small fine leopard's skin is worn as a mantle by the Hungarian noblemen of the Imperial hussar body guard. Of buffalo robes, or skins, several specimens were exhibited. The buffalo is killed in immense numbers by the North American Indians, solely for the tongue, the skin, and the bosses. They have a peculiar method of dressing the skin with the brains of the animal, in which state it is always imported. It has of late years been much used in Europe and this country as a warm travelling wrapper, its moderate price placing it within the reach of almost all classes; and in the colder climates it is similarly used also for sleigh wrappers, and cloak and coat linings. From Asia Minor we had specimens of the skin of the Angora goat, which is produced in large numbers in that part of the world, and is remarkable for its long, curly, rich, white, silky coat. It was formerly a most costly and fashionable article of ladies' wear, but it is at the present time of little value. When dyed, it takes some of the most beautiful and brilliant colours. Its low price has caused it to be adapted to weaving purposes with success. It is frequently made into very beautiful rugs for drawing-rooms, carriages, and other purposes.

FEATHERS.

The class in which furs and skins were exhibited also included feathers, the principal British display of which was by Messrs. Adcock and Co. Among their collection of feathers for dress, in a handsome glass-case in the British nave, were the several varieties of the feathers of the ostrich, dressed and undressed, which vary in quality according to soil and climate. There were some of the finer sorts, such as the Aleppo and Mogador, made into plumes, as used by the Knights of the Garter, the Knights Grand Crosses, and the King's Champion at the coronation of George IV. These feathers were also shown formed into a variety of court plumes, such as have been worn since the beginning of the century up to the present time, showing the alterations in the fashion during the last fifty years. Some of the black feathers—which come from the back and wings of the bird—are made into plumes for military purposes, as used by the Highland

regiments; some are dyed in brilliant colours, and, to show the perfection of the art, several colours are produced upon the same feather, a process never attempted until within the last twenty years. There were also specimens from the marabout stork (*leptoplilus crumeniferus*) made into plumes and screens, with the feathers of the scarlet ibis, which have a very pretty effect; some of these were also dyed various colours on the same feather. There were likewise some knotted and made into trimmings, with gold, suitable for dresses—a work of great time and patience, as every knot has to be tied separately. Some of the grey marabouts were dyed black, which, in this description of feather, is a colour very difficult to produce. The feathers of the birds of Paradise were in great variety, both in their natural state and dressed for ladies' use; some were dyed different colours, many of which, considering the natural colour of the bird (which is a bright gold), are very difficult to accomplish—as, for instance, the purple and rose colours, as well as the mixed hues, which are not very often seen. Some plumes made from the feather of the rhea, or South American ostrich, were also to be found among the collection. These feathers are usually called by the plumassiers "vultures," and are used for a variety of purposes—some for military plumes, others for ladies' wear. There were also the feathers of the emu, which are much prized on the continent, and are there known as the *plume de casoir*. The feathers of the heron (*ardeà cinerea*), which are used by the Knights of the Garter, are very valuable, owing to their scarcity—a small plume being worth fifty guineas. The plumes of the plotus aulinga (*plumes d'auligna*), a rare feather, also were in great variety, some mounted with gold and silver. These feathers are frequently called heron plumes, and are worn by persons of rank in the East. Besides these, there were the feathers of the large egret, which are used by the officers of the hussar regiments. There were also the feathers of the small egret (*herodias gurzetta*), some dyed in different colours; the feathers of the scarlet ibis, in the form of wreaths; also those of the argus pheasant, made into screens, and the feathers of the peacock. We had likewise some from the common cock, made into a variety of plumes, as well as those of the turkey, the swan, and the eagle; the latter are used in the Highland costume.

Some interesting specimens of the grebe (*podiceps cristata*) were to be seen in the fur department. This is an aquatic bird, inhabiting most of the lakes in Europe. The choicest specimens were from Geneva, Italy, and Holland. The feathers are of the richest white, having the appearance of polished silver, the plumage on the outer edge of the skin being a rich dark brown; it is used by ladies, forms a most beautiful and elegant article of dress, and is worn as trimmings for the trains of court and drawing-room dresses, for muffs, cuffs, boas, &c. It is very durable; the exquisite smoothness of the feathers prevents its soiling with wear. We next notice the beautifully soft and elastic down known as the eider-down. The bird from which this substance is taken is found in large numbers in Iceland, Norway, and Sweden. Its colour is dark grey, and its elasticity, lightness, and resistance to wet, are prominent amongst its other advantages; it is used for the inside stuffing of muffs. On the Continent the well-known eider-down quilts are, on account of their lightness and warmth, considered almost indispensable to bedrooms. The eider-down is applied to wearing apparel; by being placed immediately under the lining, and quilted, it forms one of the lightest and warmest articles of dress, both for ladies and gentlemen. The beautiful material known as "swan's-down," of which there were several specimens, is obtained from the swan after the feathers have been plucked. The feathers, prepared and purified, are used for beds, and, being exceedingly durable and elastic, are particularly suited for that purpose. The Hudson's Bay swan quills are much in demand for pens, and for artists' brushes or pencils, and command a high price. A portion of the plumage is also used for ornamental and fancy

purposes, and military plumes. Goose-down is manufactured to a considerable extent in Ireland, by being sewed on textile fabrics. The article has been patronised and sold in England extensively, for the benefit of the poor Irishwomen, by whom it is made up. The price, compared with the true swan's-down, is very moderate. Being sewed upon cloth, it can be washed; on the contrary, swan's-down must be placed in the hands of the furrier when required to be cleaned.

A specimen of the ornithorhyncus, or duck-billed platypus, a native of Australia—one of the most extraordinary animals in nature—was exhibited by Mr. Ellis, of Fore-street. The skin is very much like that of the otter, and seldom exceeds twelve inches in length; the supply is very limited. The animal is a sort of connecting link between the bird and the beast—having the claw and body of the latter, and the bill and web foot of the duck. The male is furnished with two powerful spurs on each hind leg, similar to the game cock. The female lays eggs, which she hatches, and then suckles her young brood—which extraordinary fact was not generally credited till, some years since, preserved specimens of the creature were brought to this country, and submitted to the late Sir H. Halford, who dissected them, and delivered a lecture thereon at the College of Physicians, when this circumstance was first made public. Many attempts have been made to bring them to this country alive, but without success. In the Cape of Good Hope department a tippet was shown made from the feathers of various Cape birds. From Van Diemen's Land some feathers from the mutton bird, or sooty petrel (*puffinus brevicaudus*) were shown. They are well adapted, and are much used in the colony, for pillows, bolsters, and mattresses. From the immense numbers of these birds which resort to the islands in Bass's Straits, and the profusion of feathers with which they are clothed, there would be no difficulty in obtaining the latter in any quantity that might be required. When better known in this country, it is not unlikely that they will prove a profitable article of export from the colony. In the foreign department the display of feathers was very limited. Those more particularly worthy of notice were two splendid heron plumes, contributed by MM. Perrot, Petit, and Co., of Paris, of the value of 3,000f. each, and some very fine bird of Paradise feathers. There were also some fine specimens, adapted for ornaments for the mantel-piece, for head-dresses, and screens, exhibited by M. L'Huillier and M. Lodde, of Paris.

CHAPTER V.

SCULPTURE—*continued.*

HONOURABLE MENTION: BEHNES, BISSEN, BONASSIEUX, CLESSINGER, CORDIER, COSTOLI, FRESCIA, NENCINI, GEEFS, JAQUET, LEEB, MARCHESI, MILLER, PASCHAL, SANGIORGIO, STEPHENS, THEED, THORNYCROFT, WAGNER, WEEKS—COLOSSAL STATUE OF THE QUEEN—STATUE OF THE DUKE OF WELLINGTON—MARQUESS OF WELLESLEY—VICTORY, BY RANCE—WOODINGTON'S GIRL AT THE SPRING—GROUP OF MILTON AND HIS DAUGHTERS, BY LEGREW—GROUP OF SCIENCE UNVEILING IGNORANCE AND PREJUDICE, BY THOMAS—SAMSON BURSTING HIS BONDS, BY LEGREW, ETC., ETC.

Having in our last chapter on sculpture, described the productions of those artists who received, from the award of the jury, council and prize medals, we now propose to devote our attention to the examination of the works of such as received the gratifying distinction of "Honorary Mention."

Engraved by J Moore from a Degnerreotype by

MODEL OF BREAKING-IN THE HORSE BY VON HOFER

Mr. William Behnes, of London, is the first upon our list among these worthies, being indebted for the honour he received to his statue, in marble, of "A Startled Nymph," represented as just emerging from the bath, and startled by the sudden appearance of a lizard at her feet. The sentiment expressed by the sculptor in this simple and graceful figure was one of mingled curiosity and surprise, rather than of fear or alarm. The treatment of the subject was free from any false affectation, and the beauty displayed, "when unadorned, adorned the most," was full of innocence and nature.

M. H. W. Bissen, of Copenhagen, exhibited a spirited figure of Orestes, the impassioned and poetical hero of the Greek dramatist, brandishing his sword, and rapidly moving forward. In this work the conception was full of life, the momentary character of the action well rendered, the countenance full of nobleness and grace, and the execution carefully attended to.

Bonnassieux, of Paris, and Clesinger, of Besançon, received their respective meed of praise; the first for a group in bronze, representing Cupid, as a youthful figure, clipping the tips of his own wings, a dog standing beside him. The form of the Cupid was very graceful, but it appeared to us that the head was too directly copied from the antique. The execution, moreover, was very unequal; the dog, in particular, being very carelessly modelled. The second, but for the meretricious character of his production, would have received a still higher distinction. It represented a Bacchante rolling upon the ground under the full excitement of "tipsy revelry." The figure was remarkable for the masterly chiselling of the marble, the great knowledge of anatomy, and the beauty of the countenance. But these excellences were not sufficient to excuse the sculptor for having in his work allowed his imagination to be perverted and degraded to the service of a low sensuality. We trust this young artist, whose talents are unquestionably of the highest order, will, in his future works, elevate his genius to the contemplation of purer and less exceptionable forms. Of a very different description was the unpretending but meritorious work of C. Cordier, of Paris, representing the head of a Negro, in bronze, a true example of characteristic portraiture, full of life in the conception, and masterly in execution. After the statue of the Dying Gladiator, that dignifies by its august presence the marble halls of the Roman Capitol, it appears presumptuous in a modern sculptor to attempt a fresh representation of the subject. The bow of Ulysses none of the suitor tribe were able to bend. Nevertheless, the Dying Gladiator, by Signor Costoli, of Florence, has been honourably mentioned by a discriminating and impartial jury, and is worthy of our favourable notice. Signors Frescia and Nencini, both also of Florence, have the same claim upon our praise; the one for his statue of Psyche, the other for a figure of a reclining Bacchus. They, likewise, both received "honourable mention."

The same honour was also awarded to M. Joseph Geefs, of Antwerp, for his "Faithful Messenger," in which work the sculptor has represented a dove perching on the shoulder of a young girl, to whom it has returned. The statue was very pleasing, but it was hardly a work of sufficient consequence to give an idea of the distinguished merits of this artist. M. J. Jaquet, of Schaerbeck, near Brussels, figures in the same list, for his group, in plaster, of Cupid asking Venus to restore his bow, which she has taken from him. This work was pleasing, though somewhat affected in motive. The execution was careful, though the development of the muscles, particularly on the back and shoulders, was too strong.

M. J. Leeb, of Munich, received honourable mention for his statue of a Young Girl holding a nest full of young Cupids; an extremely agreeable composition, full of *naïveté* in conception, and carefully executed in marble. The late admirable Thorwaldsen was particularly successful in these little anacreontics in marble, as his well-filled studio in

the piazza Barberini at Rome bore ample testimony. Marchesi, of Milan, next demands our notice for his statue, in marble, of Eurydice, which, although its execution was somewhat neglected, fully deserved the award it received for its design and agreeable expression. Mr. F. M. Miller, of London, was also comprised in the list, honourably mentioned, for his marble group of Two Orphan Children at Prayer; as were Mr. and Mrs. Thornycroft, for their agreeable statues, in plaster, of the Royal Children in the character of the Seasons.

M. Michel Pascal, of Paris, also received the same desirable mark of distinction for a group, in marble, of a Monk holding out a crucifix, which a little boy was eagerly kissing; a little girl was standing by, steadfastly gazing at him. There was a charming feeling for nature in the expression of the heads, but the general composition, and particularly the drapery, might be considered rather picturesque than plastic in style, and, with the exception of the nude forms, the whole was only sketched out in the marble. Signor A. Sangiorgio, of Milan, comes next upon our list for his colossal bust, in marble, of the poet Vincenzio Monti. The conception of this work was very spirited, but a little strained, and the execution most masterly and careful. E. B. Stephens, of London, for his Deer Stalker and Dog; and W. Theed, also of London, for his Prodigal Son and his Narcissus, works already noticed by us, appear in this category, which we conclude with the name of H. Weekes, for his Sleeping Child, with a Dog. In casting an eye over our review of the productions in sculpture in the Crystal Palace, it will be seen that no other nation exhibited so many works of this class as Great Britain. It was observed by the jury, that this might be partly accounted for by the fact, that the English sculptors have not been embarrassed, like those of other countries, by the cost of transporting their works from a distance; but the far greater wealth of the English, as compared with other nations, is another cause of this numerical superiority. With regard to the quality of their sculpture, it must be confessed that the productions of the modern English school, till within a comparatively recent date, have not been such as to command the approbation of the most competent judges. "In the earlier periods of English art," observes an able critic, "the name of Flaxman stands alone; and, fertile as this great genius was in invention, the execution of his works hardly equals the beauty of their conception. His influence seems to have been scarcely felt for a considerable period; the strong tendency to Realism* in the English school of sculpture found its natural expression in portraiture. Chantrey, long pre-eminent among his contemporaries, produced a great number of admirable busts; but in all the works of this period which have a higher pretension, and claim to rank as Ideal sculpture, there is a striking deficiency, not only in scientific knowledge, but in taste and in genuine Plastic style.

Having now in this and in several preceding chapters expatiated on the magnates among the sculptors, such as were deemed, in the opinion of an enlightened jury, worthy of distinction, from the envied holder of a council medal, to the gratified receiver of "honourable mention," we will now bestow a glance or two towards those less favoured sons of the chisel whom we do not consider the "*oi polloi*" of their race, merely because their contributions were altogether unnoticed in "the Reports." Some of their works, in companionship with those of their more favoured brethren, have, in the opinion of *our* talented jury, been deemed worthy of illustration by the burin of the most distinguished

* A work is called Realistic when the artist restricts himself to the task of rendering an individual model in all its parts, forms, character, and the like, just as they appear before him. On the other hand a work of art is called Ideal when the artist modifies the figure in these same respects according to his own feeling for its inner significance and outward beauty of form—attributes which necessarily vary in each case.

H.R.H. PRINCE ALFRED

H.R.H. PRINCE ARTHUR

[illegible] of Mary Thornycroft

[illegible] PRINCE OF WALES

[illegible] WINTER

[illegible]

[illegible]

Found from a Jay [illegible]

REBECCA

FROM THE ORIGINAL BY W THELD

Engraved by T Hollis from a Daguerreotype

THE MADONNA

FROM THE ORIGINAL MARBLE BY P VANUCCI

Engraved by Ball, From a [illegible]

MILTON AND HIS DAUGHTERS

FROM THE ORIGINAL BY LEGREW

[illegible]

Engraved by D Pound from a Daguerreotype

ROSOMONDA.

THE ORIGINAL BY JOHN THOMAS.

Engraved by D Pound from a Daguerreotype

VICTORY

THE ORIGINAL BY PROFESSOR RANCE OF BERLIN

Engraved by D. Pound from the Original Statue by T. Milnes

THE DUKE OF WELLINGTON

A Model of which was exhibited in the [illegible] A.D. 1851.

JOHN TALLIS & COMPANY LONDON & NEW YORK

Surrounds me, from the cheerful ways of men
Cut off, and for the book of knowledge fair,
Presented with a universal blank
Of nature's works to me expunged and raised,
And wisdom at one entrance quite shut out.
So much the rather thou, celestial light,
Shine inward, and the mind through all her powers
Irradiate; there plant eyes, all mist from thence
Purge and disperse, that I may see and tell
Of things invisible to mortal sight."

In the vicinity of the above described group, was an allegorical composition by Thomas, denominated "The Spirit of Science unveiling Ignorance and Prejudice." We do not particularly admire allegory, either in sculpture or in painting. Even in poetry it is wearisome. The sweet and impassioned language of a Spenser renders it barely endurable. The glowing tints and vigorous delineation of Rubens fail to give it interest, and sculpture wastes her powers on mystifications, that are generally unintelligible without the aid of lengthened description. In the present subject, we see no reason to change our opinion, as to its failure in respect to interest. "Sampson Bursting his Bonds," by Legrew, was not so felicitous an attempt as his Miltonic group. The artist has fallen into the usual error of nearly every one that has treated the subject, of representing his hero as a mere man of extraordinary weight and muscle. Scripture does not authorize the idea that the divinely gifted Nazarite was nothing more than a brawny giant, if he was a giant at all, or that his strength, like that of ordinary mortals, was consequent on physical superiority; the gift was mysteriously placed in his hair, and when his locks were shorn from his temples, his strength departed from him, although it cannot be pretended that his bodily frame, the compactness of bone and muscle, was one whit diminished or in any respect impaired. No—the divine gift, the heavenly inspiration, was altogether wanting. We were tempted, as we stood before this ponderous piece of muscular development, to exclaim with the chorus in Milton's noble poem—

"Can this be he,
That hero, that renowned
Irresistible Samson?—whom unarmed,
No strength of man, or fiercest wild beast, could withstand;
Who tore the lion, as the lion tears the kid;
Ran on embattled armies, clad in iron,
And, weaponless himself, made arms ridiculous?"—*Samson Agonistes.*

We now turn to a classical subject in *basso rilievo*, by Physick, "Pluto and Proserpine." Of all fables of antiquity, none is more redundant of magnificence and gorgeous imagery than that of the Rape of Proserpine, as treated by the courtly Claudian, of whose enduring reputation, indeed, it forms the basis. Mr. Physick's highly poetical conception of the subject, and the spirit with which he has executed it, authorises, or rather demands a somewhat more detailed account of it than we can in general find room for, in our criticisms on individual performancs. After a brief, but highly poetical introduction, the poet proposes at once his theme—

"Of hell's dread ravisher, whose fiery car
And ebon steeds affrighted from their spheres
The train of night; of Pluto's bridal bower,
Dark in its festive gloom with horrid shades,
My labouring mind impels my eager voice
In daring notes to sing. * * * O, say,
What torch of love inspired the gloomy king,
What sudden seizure doom'd stern Proserpine
To joyless chaos."

We are then let into a few "family secrets," and we find that Pluto thinks himself, and with sufficient reason, very ill used by his brother Jupiter, who seems resolved to keep him in a state of celibacy, as well as in one of comparative exile among scenes "hideous and wild." He broods over his wrongs, till he feels inclined to call upon the furies and all his shadowy subjects, to aid him in his desire to avenge them, and turn the realms above into an uproar. From this he is dissuaded by the fates, who, kneeling before him, and strewing at his feet "their locks white with severest age," recommend the peace measures happily coming into vogue in the present day, and an appeal to the *moral force* of truth and fair argument. Accordingly, he sends Mercury to represent his wrongs to the ruler of the skies, who, after deep and deliberate cogitation, determines that the fair daughter of Ceres shall be the bride of the monarch of the dead. He accordingly instructs Venus to entice the fair Proserpine to the fragrant fields of Enna, "parent of sweet flowers;" where, while she is disporting with her attendant maidens,—

"Suddenly a tumult wild and loud
Arises; turrets bow their trembling heads,
And towers and lofty spires are levelled low;
No cause appears; the Paphian queen alone
Acknowledges the sign, and trembling feels
A doubtful pleasure, mixed with secret fear.
And now the dark-browed ruler of the dead,
Through shades, and winding caverns of the earth
Urges his fiery steeds. * * * * *
* * * * * Fast fly the nymphs,
Fair Proserpine is hurried to the car,
Imploring aid."—*Strutt's Claudian.*

Having now arrived at the point of action represented in Mr. Physick's *basso rilievo,* we will dismiss the fair Proserpine to the care of the enamoured ruler of the shades below, and turn to an *enlèvement* on a larger scale, celebrated in the early history of Rome, an incident in which the Marquis Ginori has sculptured in Parian marble on a small scale; and he has succeeded in producing an interesting and well-arranged group. "The Hours leading forth the Horses of the Sun," executed in rilievo for Earl Fitzwilliam, by Gibson, is a very classic and masterly performance, full of animation and spirit. This has always been a favourite subject, both with the sculptor and the painter. Every lover of the fine arts is acquainted with the exquisite fresco, representing the same subject, by Guido, in the Rospigliosi Palace, at Rome, so full of graceful elegance and poetic fancy, and of which the engraving of Raphael Morghen has so widely circulated the fame, without, however, equalling the surpassing beauty of the original.

Mr. Spence, a pupil of Gibson's, exhibited a statue of considerable merit, entitled "Highland Mary;" a personification of the maiden whose beauty and attractive grace enthralled the susceptible heart of the poet Burns, and whose early death he deplores in the following beautiful lines:—

"Thou lingering star with lessening ray,
That lov'st to greet the early morn,
Again thou usher'st in the day
My Mary from my soul was torn.
O Mary, dear departed shade!
Where is thy place of blissful rest?
See'st thou thy lover lowly laid?
Hear'st thou the groans that rend his breast?

That sacred hour can I forget,
Can I forget the hallow'd grove,
Where by the winding Ayr we met,
To live one day of parting love!

Eternity will not efface
Those records dear of transports past;
Thy image at our last embrace;
Ah! little thought we, 'twas the last.

Ayr gurgling kiss'd his pebbled shore,
O'erhung with wild woods thickening green;
The fragrant birch and hawthorn hoar,
Twined amorous round the raptur'd scene;
The flowers sprang wanton to be prest,
The birds sang love on every spray—
Till, too, too soon, the glowing west
Proclaimed the speed of wingéd day.

Still o'er these scenes my memory wakes,
And fondly broods with miser care;
Time but the impression stronger makes,
As streams their channels deeper wear.
My Mary, dear departed shade!
Where is thy place of blissful rest?
See'st thou thy lover lowly laid?
Hear'st thou the groans that rend his breast?"

While we are discussing these *quasi*-domestic subjects, we must not omit to notice two which have been drawn from the writings of the admirable author of *Pickwick*.—The first of these, "Oliver Twist," represents the interesting subject of the memoir, in his forlorn and destitute state, before he is accosted by the "artful dodger;" this was in the American department, and was the production of Stephenson, who exhibited the Wounded American Chief. The latter, "Little Nell and her Grandfather," was from the chisel of William Brodie, of Edinburgh, and formed an exceedingly attractive group. The point of time chosen was, when the old man had just escaped the fangs of the gambling sharpers, whose persuasion and advice had nearly driven him to exchange poverty for crime; and when his faithful Little Nell, like a guardian angel, had prevailed upon him to fly from the scene of temptation; but when "the noble sun arose, with warmth in its cheerful beams, they laid them down to sleep upon a bank hard by some water. But Nell retained her grasp upon the old man's arm, long after he was slumbering soundly, and watched him with untiring eyes."

The little group called "Love Triumphant," is one of those prettinesses in marble, which take rank with the minor productions of Simonis, and about which there is always a little knot of sympathisers in all public exhibitions. It is pleasant to see an artist of high merit descending to these lighter and more playful compositions. Thorvaldsen had, in the abundant treasures of his studio, many similar graceful trivialities, which never failed in attraction to all genuine admirers of art. But here, for the present, we conclude our remarks; in a future chapter we may perhaps devote a few more pages to the further consideration of this branch of the fine arts, gleaning here and there such remaining examples as may be likely to awaken the interest, and gratify the taste of our critical readers.

aved by D Pound from a Daguerreotype

LOVE TRIUMPHANT

FROM THE ORICINAL OF BIENAIMAIE OF ROME

Engraved by D Pound, from a Daguerreotype

INFANT BACCHUS

CARVED IN MARBLE BY IORDAN'S PATENT PROCESS

CHAPTER VI.

MR. WORNUM'S LECTURE—VARIOUS STYLES OF ART—REMARKS ON ORNAMENTAL DESIGN—ON CHINA, GLASS, AND SILVER—ENGLISH WOOD-CARVING—ORIENTAL DESIGN—ENGLISH AND FOREIGN ART COMPARED—CAUTION TO THE STUDENT—TEACHINGS OF THE EXHIBITION.

In the year of the Great Exhibition, it was curious to observe how the thoughts and conversation of all people turned upon the prevailing topic of interest, "the world's great show." Not only was the fruitful theme discussed in every private party, canvassed at every domestic hearth, but public lecturers and scientific writers also indulged in frequent allusion to, and serious investigation of, the actual state and future results of the mighty phenomenon. The following is the substance of a very interesting lecture delivered by Mr. Wornum at the Central School of Design, which we lay before our readers, not only to illustrate our remark, but as a very instructive piece of "gossip," if we may be allowed the term.

"My object," says the talented lecturer, "is not to explain the Exhibition, even generally, but rather to make use of the Exhibition, or more correctly, some prominent works of art-manufacture contained in it, as one huge illustration of the general principles I have advocated throughout in my lectures. There is not one point that I have urged that is not there practically demonstrated to be of essential importance; and I think I shall be able now to clearly show you that the very first business of every designer is to make himself master of the elements of all established styles, not only for the sake of knowing these styles, but to enable him to effect any intelligible ornamental expression whatever. You must know all: to study one style only will, perhaps, prove more fatal to your success than to study none at all; for, in the latter case, you are open to improvement and new impressions, while in the former your mind is, as it were, a stereotype of a few fixed ideas with which you stamp your uniform mark on everything you touch, as the ignorant knights of old made their sign-manual with their sword-hilts, or their thumb-nails. We have seen '*nature*' very often sententiously held up as in antagonism to the so-called historic styles, or absolutely in antagonism to art; this is only the outrageous presumption of ignorance. I need not demonstrate to you, that true art can never be the antagonist of nature. The treasures of art are derived as legitimately from nature's stores for the recreation of our minds, as the grains and fruits of the earth are provided by the husbandman's skill for the nourishment of our bodies. If pure '*naturalism*' is true for the mind, I maintain it is true also for the body; yet if so, there is nothing left for us but all to go out to grass. However, what is nature? We hear of three kingdoms of nature—the vegetable, the mineral, and the animal: one cannot be more natural than the other; therefore, on the score of *nature* herself, we cannot give the preference to any one in particular.

"The naturalists generally have not gone to nature, but only to one small class of individuals in one of its kingdoms. Let us by all means go to nature, but with a strict impartiality, selecting our forms simply with a view to the most appropriate contrasts or combinations in accordance with the sentiment of the design we have in hand, at once repudiating, *in toto*, the notion that mere imitation can in any way compensate for an incomplete or imperfect arrangement of the parts, as prescribed already by the very sentiment or principles of the contemplated design. This brings us to another point—how far using the elements of past times may be deprecated as a slavish repetition of ancient or mediæval art, and ignoring the wants and sentiments of the present age?

Such a result may accrue if we cannot separate old elements from old sentiments; we must, however, go very much out of our way to verify any such disaster, and certainly only by, in the first instance, adopting an old sentiment, as in the so-called Mediæval Court in the Exhibition. But there are, as I shall show as we proceed, very many works in the Exhibition eminently suited to the wants and sentiments of the present age, though composed as ornamental designs, entirely of old elements. The fact of ornamental elements being established favourites of remote ages, does not make them old in a bygone sense, unless they have sprung from a sentiment that is bygone. Many ancient and middle-age forms, if reproduced now in their genuine original character, would be at best but whimsical revivals; but beauty can never really be antiquated or old-fashioned, whatever the conventionalities of the day may be. What is inherently beautiful is for all time; and the repeated attempts at the revival of classical forms, with a steadily increasing interest on the part of the public, in spite of fashions or conventionalisms the most opposite, is at least one sure test of the inherent beauty of these forms. It is a morbid state to hunt after variety purely for variety's sake; and it is perfectly legitimate to preserve all that is beautiful, however we may continue to prosecute the search of the beautiful in other provinces; and there are still unexplored regions of nature left for us. It must be evident that efforts at variety, unless founded on the sincerest study of what has been already done, not by our own immediate rivals in our own time, but by all people at all times, are at most but assumed novelties; but if such really, the chances are that it is their only recommendation, as was the case with the Rococo, the novelty of which represents the exclusion of all the beauty of the past. "What is recommended by use never grows old: it is only what is fostered by fashion that will be superseded as a new fashion arises. So it is with the duration of the styles: some are characterised by mere local peculiarities or special objects, others by abstract principles. Local peculiarities, and all specialities, when their causes cease, must die out, and cannot be revived except by a revival of the cause; and so, if their causes cannot be recalled, it will be impossible to revive several of the historic styles; but where the causes of styles still exist, the styles themselves are as much of this age as of the past. The Classical and Renaissance styles are founded on abstract principles, and therefore may and must be revived as soon as their motives are thoroughly understood; and such a restoration is not a copy of an old idea, but a genuine revival of a taste—a very different thing from merely copying designs. "Then to apply our test to the Exhibition itself: it is generally admitted that in spite of much that is bad and indifferent, it offers, on the whole, an unprecedented display of art-manufacture. Of course, in the general review I now propose to take of this wonderful collection of the world's industry, I must limit my remarks, if I am to be at all practical, to the most prominent specimens only, or even to the mere treatment of classes of manufacture; and at present my object goes scarcely beyond an attempt to show you that all the most remarkable works there displayed owe their effect to a skilful management of the results of the labours of generations that have gone before us; from the study and mastery of past efforts, and not from any sudden impulse of genius or any intuitive adaptation of nature. All that is good is the result of the *study of ornament*, more or less universal or singular, according to the method of that study. The Exhibition contains nothing new—not one new element, not one new combination; and yet it represents, vast as it is, only a small proportion of the great national expressions of ornament, of past ages of the world. And in many cases we have very much more the simple reproduction of an old idea, than the veritable revival of the genuine artistic feeling of the past."

The lecturer then proceeded to illustrate his remarks by reference to portions of

Engraved by G Greatbach, from a Drawing by Mason

CALIFORNIAN GILT TEA SERVICE.

PRESENTED BY THE MAYOR & CITIZENS OF NEW YORK TO C. R COLLINS, ESQ
MANUFACTURED BY MESSRS BALL, THOMPSON & BLACK, NEW YORK.

Engraved by G Greatbach from a Drawing by Mason

[illegible] BREAKFAST SERVICE

the Exhibition. In Messrs. Wedgwood's stall he found a genuine revival of artistic feeling; and in Mr. Battam's a reproduction of old ideas. He spoke of the Sèvres room as showing general magnificence ,and classical taste. The glass stall of J. G. Green, of London, was another illustration of a legitimate application of an old taste to modern purposes. With reference to bronzes, the display of these, considering the applicability of the material, he thought remarkably small in the Exhibition, and the general taste trifling. He specially pointed out those by Potts and Messenger, those in the Cinque-cento style by Villemsens, and for general good taste, those by Mattifat. The genuine reproductions of the Renaissance by Barbèdienne; and the damascened work by Falloise, of Liège, were much to be admired. The silver work displayed the three tastes—Classical, Renaissance, and Louis XV. A vase, or centre-piece, by Wagner, he considered the finest thing there. A tea-service, by Durand, was noticed. The lecturer treated at some length on the specimens in oxidized silver, and showed the advantage of the method for the display of art. The works of Froment, Meurice, Rudolphi, and Gueyton, were especially mentioned. The Rococo prevailed too generally in English work. The classical specimens, by George Angel, were very admirable. The fine Cinque-cento centre-piece, by Brown (Hunt and Roskell), suffered, he thought, by frosting and burnishing. In the carvings there were specimens of Renaissance, Cinque-cento, and Louis XV. Fourdinois and Barbèdienne stood pre-eminent. Rinquet-Leprince, Durand, Krieger, Leclerc, and Cordonnier were noticeable. Lechesne's frame, in the Cinque-cento style, he considered a very fine work. After some remarks on the Austrian furniture, on the whole complimentary, the lecturer proceeded as follows: —The objections to English carving imply every want but those of mere mechanical skill and means. There is a want of definite design, and a disregard of utility: there is an overloading of detail, and an inequality of execution, often fatal to the whole effect. In some instances, where the human figure is mixed up with conventional ornament, the last is perfectly well executed, while the former is absolutely barbarous in conception and in execution. Other specimens found their pretensions solely on profusion of details: others, again, are conspicuous only for their bad style, or their Baroque mixture of styles. Let us, then, briefly sum up the conclusions that we may draw from this cursory survey that we have just made; and let every designer treasure it in his mind, for in this result he will have presented to him more forcibly than in any other way, the paramount importance of a knowledge of ornament over and above an artistic or manual dexterity. The Exhibition has pretty well proved that the most dexterous of all artists are the French, yet what an inveterate sameness their works must present to the French eye, from their so generally adopting the same style in almost ever branch of manufacture. A French design not in the ordinary Renaissance, is almost a curiosity: we certainly do find French examples of Greek, Gothic, and the now generally discarded Louis XV., but they are the rare exceptions. No skill of execution can ever atone for such excessive mannerism as this. The wide-spread influence of France, in spite of the most debased taste in design, the Rococo, is one curious picture presented to the mind by this assemblage of the world's industry.

Another great fact displayed, perhaps unavoidable where true education is absent, is the very general mistake that quantity of ornament implies quality. In the Oriental works, where quantity of detail is also the chief characteristic, it is of a kind so generally unassuming in its details, and harmonious in its effect and treatment, that the impression of quantity itself is the last that is conveyed, though the whole surface may be covered with ornament. We find the best specimens of ornamental design, as a class, are of the Renaissance, but the great bulk are of the Louis XIV. varieties: classical art is scarcely represented, and the Gothic is only very partially so. We have, indeed,

only three decided expressions of taste, the Classical, the Renaissance, and the Louis XV., for what we have of the Gothic we owe to sentiments distinct from ornament. These three tastes are very distinct: we have in the first, the classical or Greek, a thoroughly well understood detail, with a highly systematic and symmetrical disposition of these details: in the second, in the Renaissance we have also a well understood detail, but a prevalence of the bizarre, and of a profusion of parts; great skill of execution, but a bewildering and fantastic effect upon the whole; in the third, the Louis XV., we have a total disregard of detail, therefore a purely general effect. And this I believe to be a fair picture of the present general state of ornamental art in Europe, a condition out of which it is the task of the schools of design to extricate it; and if we may judge of the fruits of the French schools, it would appear the especial province of the English schools to perform this service; for the uniform practice of the French seems to show that they are too much absorbed in the execution of details, to give any great attention to distinct varieties of ornamental expression. If a general inferiority in design must be admitted, on the part of England, it is much less in the application than in the taste and execution of the design itself, irrespective of all style. However, in the more magnificent foreign productions, especially those of France, there is a disregard to usefulness, or the general wants and means, which very much detracts from the high credit the execution of the work would otherwise ensure. It would be no distinctive feature of the age to work well for princes: princely means have secured princely works in all ages; and the Exhibition will have done nothing for this age, if it only induce a vast outlay of time and treasure for the extreme few who command vast means. While the efforts of England are devoted, for the most part, to the comfort of the many, France has expended its energies as positively over luxuries for the few: it is an amalgamation of the two that we require,—fitness and elegance combined. When a costly work, however, is distinguished by exquisite taste, it is something more than a specimen of costliness, and a skilful work will be beautiful, not by virtue, but in spite of its materials. Good taste is a positive quality, however acquired, and can impart such quality in perfection to even the rudest materials: it is taste, therefore, that must ever be the producer's most valuable capital, and it is a capital that the English designer and manufacturer may very materially accumulate by a careful inspection of some of the more important foreign contributions in the Exhibition. I have only, then, to again caution you, that notwithstanding the unrivalled display of magnificence now assembled from all quarters of the world in Hyde Park, the great art of the ornamentist is still only partially represented, as compared with the aggregate of past efforts and achievements; that great styles, individually capable of as much display and variety as the whole of this unique collection together offers, are barely touched upon; that this vast store is at the student's feet, to be gathered into his granary, as the meadows spread their honey before the bees, if he will only extend his search beyond the reach of his hands. The time has perhaps now gone by, at least in Europe, for the development of any particular or national style; and for this reason it is necessary to distinguish the various tastes that have prevailed throughout past ages, and preserve them as distinct expressions; or otherwise, by using indiscriminately all materials, we should lose all expression, and the very essence of ornament, the conveying of a distinct æsthetic impression on the mind, be wholly destroyed. For if all objects in a room were of the same shape and details, the want of individuality would be so positive, that the mind would soon be fatigued to utter disgust. This is, however, exactly what must happen on a large scale, if all our decoration is to degenerate into a uniform mixture of all elements, or if we allow any one class of elements to engross our exclusive attention: nothing will be beautiful, for nothing will present a new or varied image to the mind.

TEACHINGS OF THE EXHIBITION.

For the following remarks on the instructive nature of the Great Exhibition, we are indebted to the columns of *The Builder*. It is, indeed, something to have entered that huge hive of the industry of all nations, and to have carefully examined its stores of intellect contributed by all quarters of the globe; to have seen the ingenuity that has been applied to productions of every kind more or less distinguished by their peculiar merits, and valued either for their elegance, their grandeur, or their utility, and to have noticed the diversity of thought and intelligence with which the genius of every country has displayed itself. Among its multiplicity of objects, every faculty of the mind is appealed to, as every faculty has therein been exercised; every taste is presented with the best specimen of whatever is its favourite subject for study; every form that it was possible to devise in order to gratify the desire of the fastidious or supply the wants of the wealthy, meets us; and every species of art and mechanism, simple or elaborate, is here brought to its highest degree of development. The student who is yet unknown —the man who has long exercised the fine skill of his hands—the mechanic and the artisan, each, amid the wonders enshrined in this palace, can add to his knowledge and to his experience. Such a living encyclopædia as this is a means of instruction, a lever of education, that was long wanting to the solitary and unassisted student, who, being ignorant of what former ages and countries *had done*, could not tell what it was in the power of mind *to do*. The fragmentary and scattered forms in which knowledge was conveyed to him served rather to bewilder than enlighten. The present sons of industry have not, however, to bewail this deficiency, nor to labour under this disadvantage; a glorious edifice being now open to them condensing all the discoveries of science, and all the conquests of the mind. It is in this Exhibition that all see fresh motives to industry, and further inducements to excellence. The opportunities it offers for study to visitors in general, considering how much knowledge, artistic and mechanical, natural and artificial, must come by sight, are not to be slighted; but the professional carver, sculptor, and draughtsman, appreciate the opportunity it offers to them for directing their talents. To all engaged in the arts, it is a standard for correcting and advising such as have bent their minds in a wrong channel, or seen with imperfect eyes; who have made a bad use of their powers, and not employed them in the direction to which they were naturally inclined. Let all such profit themselves by comparing what they *have done* with what they *might have done*. This is one of the great teachings of the Exhibition. It is, we think, indisputable, that all may at least inform their minds by the contemplation of such accumulations of beauty and magnificence. Even they who do not seem to have any interest for such things, will go away impressed with ideas new and uncommon; with feelings, likely, perhaps, to refine their natures, more than those of a different character, to which they are every day familiar; and wherever there exists the capacity to receive the influences of this place and its contents, noble ideas will assuredly be admitted into the mind of the recipient. And whilst, in an industrial and manufacturing point of view, the effect of this Exhibition will be beneficial, it at the same time is calculated to work moral results, which are of great importance from their bearing upon and being conducive to eminence. Whoever enters this spacious and splendid pile with notions of vanity or arrogance, will certainly receive a check and a cure—he will feel his littleness by the superiority that surrounds him everywhere, to which he will be forced to make comparison. This is a useful teaching indeed. Whoever, also, hopes for those triumphs of hard-working and patient labour at which he gazes, will be induced to work himself with greater earnestness than heretofore, to qualify himself for the abilities necessary for their attainment. Whoever thinks he is

great in criticism, and can make or mar a reputation, will experience the difficulty there is for the best trained judgment deciding between the conflicting and distracting pretensions of such a vast variety of objects. Here is another great teaching; and with it an argument, if one were needed, in favour of this museum of all nations, and for repeating attempts of this kind, even on a smaller scale; for thousands who have not the inclination to form their judgments and modulate their feelings to works of art and ingenious fabrications through books and the theories of men who comment and criticise upon them, would yet put themselves to some personal trouble and inconvenience for seeing and judging for themselves such a pile with such attractions. And it cannot be denied but that they are under the best tuition. Beautiful works proclaim their own merit, and force conviction. They have the force of examples seen by the eyes over theories read unwillingly by the mind. They *show* the substance of true taste, and what it is: your critics and books can only *tell* it.

CHAPTER VII.

VOLTAIRE IN THE CRYSTAL PALACE.

RAILWAY TRAVELLING—REFLECTIONS ON THE STEAM ENGINE—THE PLOUGH AND THE PRINTING PRESS—ANCIENT AND MODERN CITIES—JEWELS AND GLASS BEADS—ITALIAN AND ENGLISH SCULPTURE—FRENCH TASTE—THE MEDIÆVAL COURT—LUCIFER MATCHES—THE TIMES NEWSPAPER—FIRE ARMS—MODEL OF A PYRAMID—PRINCE ALBERT'S MODEL LODGING HOUSES, ETC., ETC.

"Millions of spiritual creatures walk the earth
Unseen, both when we wake, and when we sleep."—*Milton.*

Such is the declaration that the immortal bard puts into the mouth of our great progenitor. And our old friend, Christopher North, bears evidence, in one of his learned lucubrations, to the truth of the statement, inasmuch as he testifies from ocular experience, to the appearance, within the walls of the Great Exhibition, of a *revenant* of considerable celebrity in the world of letters. We allude to the philosopher of Ferney, the shrewd, the keen, the inquiring, the sarcastic Voltaire. In fact, our neighbours north of the Tweed have always been celebrated, not only for the keenness of their optics for the second sight, but also for their prompt recognition of ghosts and wraiths of every description. Hence we readily enter into the statement of our contemporary respecting the appearance of this sceptical personage, who, it seems, was resolved to ascertain for himself the truth of the wonderful accounts he had heard of the Crystal Palace, whether in the regions above or below we do not take upon ourselves to inquire. "It was impossible," says our friend Christopher, from whose columns we extract the following passages, "to keep him quiet—there would have been no peace in the shadowy regions of the departed, unless this energetic, inquisitive, self-willed spirit, had been allowed to have his own way; and Voltaire, rising to the earth in the city of Paris (where else could his spirit rise?) started by train to see the Great Exhibition. Reports had reached him that in a Crystal Palace, not far from the Thames, were to be assembled specimens of the industry of all nations—nothing less than a museum of the works of man. But it was not this only that had excited the curiosity of the philosopher of Ferney. Rumours of a new era of society, of unexampled advancement or development of mankind, had from time to time descended into the territory of the shades, and had kindled a desire

to revisit the earth. * * "Progress! progress!" muttered our returned philosopher to himself, as he whirled along upon the railway. "What a din this age makes about its progress! it travels fast enough, if that were all. Rapid progress of that kind. For the rest—let us see whether the world is revolving in any other than its old accustomed circle." After taking a brief survey of the building itself, and expressing, in various muttered ejaculations, his admiration of its marvellous size, its lightness, and its wonderful adaptability for the purpose for which it was erected, the quondam lord of Ferney proceeded to the department where the machinery was exhibited. Here a professor of mechanics was so courteous as to explain to him the various processes of our cotton manufacture. He explained the power-loom, the mule, and I know not what other contrivances beside; and, pleased with his intelligent listener, he launched forth into the glorious prospects that were opening to human society through the surprising mechanical inventions that had illustrated our age. To labour man was born, he said, but we should take the sting out of the curse; it then would cease to be toilsome, cease to be degrading cease to be incompatible with refinement of manners and intellectual culture. Stepping through an open door into a neighbouring department, the professor found himself in the presence of a gigantic locomotive standing upon its railway. "Here," he exclaimed, "is one of our iron slaves; we feed him upon coal; he bears us, a thousand at a time, with the speed of an eagle, from town to town, from county to county. What limit can you set to human progress when you reflect upon such an engine as this?" Voltaire did reflect. "Very clever are you men," he said; "you cannot exactly fly—you have not yet invented wings—but you go marvellously fast by steam. No spirit need travel quicker. But methinks there is something hypocritical and deceptive in this obedient engine of yours. Goes of itself, you say. Does it? Your iron slave wants many other slaves, unfortunately not of iron, to attend on it; on this condition only will it serve you. No despot travels with so obsequious a train, and so subservient, as this quiet-looking engine. Putting my head out of the window of my railroad carriage, whilst we were yet at the station, I saw an industrious mortal going from wheel to wheel with a huge grease-pot, greasing the wheels. He greases wheels from morning to night; eternally he greases. Another man trims lamps incessantly; I saw him with a long row before him feeding them with oil; in oil he seems himself to live. Of engineer and fireman I could not catch a glimpse, but I saw a crowd of men employed continually in putting boxes and carpet-bags from a truck into a van, and from a van into a truck. Not much intellectuality there. And when the shrill whistle was heard, and we started, lo! there was a living man standing on the bank, acting as signal-post—with arm outstretched and motionless, a living signal-post. Most useful of men no doubt, if mortal necks are worth preserving, but his occupation is not such as could possibly be intrusted to one who might wander into reflection. The railroad train runs, it seems, not only upon those hundred wheels of iron which we see and count, but on a hundred other wheels forged out of human flesh and blood."

"You are perfectly right," said a pale melancholy Englishman who was standing beside them, and had overheard this conversation. "We are altogether in a wrong course; we are making machines that enslave ourselves, and bind us down to all the toils and all the social degradations of slavery. We must go back to simplicity. We must learn to limit our desires, and discard fictitious wants. Then only can the reign of Justice commence. If all men were contented with the gratification of the simple wants of nature, all men might be equal, and equally enlightened. Our task ought now to be not to invent more machines, but to select from those already invented the few that are really worth retaining. For my part, I find only two that are indispensable." "And what may they be?" said the professor of mechanics, with a smile of derision. "The plough

and the printing-press. With these two, and the principle of justice, I would undertake to make a happy community of human beings. Bread and books! what more do we need? Here is supply for mind and body." "No! no! no!" exclaimed Voltaire, who retained all his horror of this return to primitive simplicity. "Get as much civilisation as you can. Let as many enjoy it as can. If you had nothing but the plough, you might dispense with your printing-press as well. What on earth would your rustics have to write about? Bread and books! and what sort of books? Bread, books, and an Egyptian priestcraft—pray complete your inevitable trio." "Sir, you blow hot and cold with the same mouth. Our mechanical inventions are but rivetting their fetters on the industrial classes: you see this; and yet when I would break the machine you interpose." "He who talks on man must blow hot and cold with the same mouth. He has always lived, and always will live, in the midst of contradictions. Let us hear nothing of this return to simplicity and ignorance. No savage happiness for me. The Fuegans—so a traveller from South America once told me—when they are hungry, kill a buffalo, and, scraping the flesh from off the bones, make a fire of these bones to roast the flesh withal. What admirable simplicity in this self-roasting ox! Here is your golden age at once. I recommend to you a voyage to Terra del Fuego." "Are we, then, said the plaintive idealist, "to see nothing in the future but the contradictions and turmoils and iniquities of the past?" "And what men endured in the past, why should not you also and your posterity endure? The type of civilised society has been again and again presented upon the earth: we may improve, we cannot materially alter it." "There," said the professor of mechanics, "I must be allowed in some measure to differ from you. I observe that you have a due appreciation of the arts and inventions that contribute to civilisation; but you do not sufficiently understand the enormous progress that this age has made beyond all others." "Pooh! pooh!" said his impatient auditor, "there is a vast difference between civilised life and savage, but the progress you make afterwards is but slow and slight. You take a wild country, and from a swamp reduce it to a cultivated plain. Corn is growing in the field. The change is immense. Well, you may grow still more corn in the same field, but you can never produce any other change like that which it has already undergone. Between the wild Celt or Saxon, and the civilised inhabitants of Paris or London, who would not acknowledge the difference? But I would as willingly have lived in the Paris of a hundred years ago, as in the Paris of to-day. A wealthy citizen of Bruges or of Florence in the fifteenth or sixteenth century passed, I suspect, as rational, as agreeable, and as dignified a life as the wealthy citizen of your own monster metropolis in the nineteenth century. He would not enjoy quite such immense feeding—not such luxurious banquets as your Guildhall and your Mansion-house can boast, where you spend as much at a dinner as would have built the Parthenon—but he, perhaps, found a compensation in a keener zest for art: at all events he lived in a city which had not quite blocked out every charm of nature, in which every green thing had not withered, and where the sky was still visible. At Athens and Rome, and, for aught I know, at Babylon and Thebes, men have enjoyed life as keenly, and lived as wisely as they do here. Many are the eras of the past where you may point to the *city*, the seat of government and the arts, and the neighbouring cultivated *country* where the peasantry have enjoyed the protection, and shared to some extent the mental culture, of the town. Such has been the type of civilised society hitherto; nor is it always that the last instance in order of time presents the most attractive picture.

"I walk," he continued, "through the spacious streets and squares of London. I see the residences of your wealthy men: the exterior is not pleasing; but if I enter, I find in each what deserves to be called a domestic palace. In these palatial residences,

Engraved by G Greatbach, from a Drawing by T H Wilson

VASE OF LAPIS-LAZULI AND GOLD ENAMEL.

BY M. MOREL

VASE OF AGATE AND GOLD ENAMEL

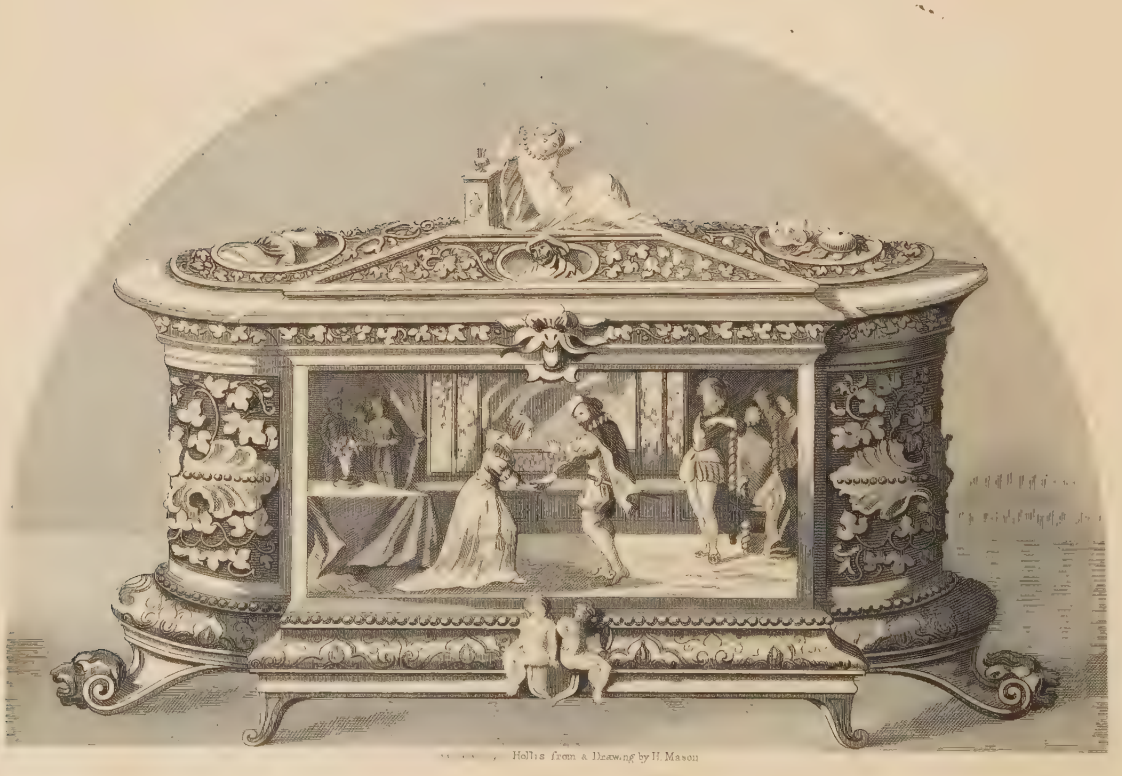
BY M. MOREL

Engraved by T Hollis from a Drawing by H Mason

EBONY CASKET IN RICHLY CHASED ORMOLU,

WITH SERPENTS UPHOLDING ANTIQUE CORAL CAMEOS

BY C ASPREY, BOND STREET



Hollis from a Drawing by H Mason

CASE IN ELECTRO PLATED SILVER, BY CLYTON

ANCE STYLE — IN THE FRENCH DEPARTMENT

many a merchant is living amongst luxuries which no Roman emperor could have commanded. I lose my way amidst the dark, noisome, narrow streets and interminable courts and alleys of this same London. Each house—each sty—swarms with life. And oh, heaven! what life it is! They are heaped like vermin. They prey upon each other. How they suffer! how they hate! Full of corroding anxieties, they endure a wretchedness and torture which no Roman emperor could have inflicted upon his slaves." "But, sir——" "I tell you I have seen the beggar at Naples. He is a prince. He lies in the sun, on the earth—it is his home—and the open sky above him, it is his. He rises to beg, or to work, or to steal—he does either with a savage energy—then lies down again, no leopard in the forest more carelessly dispread. But poverty in England is steeped to the lip in bitterness, in care, in hatred, in anxiety. When bread comes, it is eaten with fear and trembling for the future. Tears are still flowing upon it. Yes, you have indubitably progressed thus far: you have made hunger reflective." "But, sir, we are at present in a state of transition. Say that hunger has become reflective: in the next stage of our progress the reflective man will have protected himself against the chance of hunger." "A state of transition! I am charmed with the expression. What age ever existed that could not have accounted for all its sufferings by this happy word, if they had known it? Oh, the world, I think, will be very long in a state of transition! But, gentlemen, we must use our eyes, as well as other organs—however gratifyingly employed—in a place like this. Pray, what is that," he inquired, as they stepped into the central avenue of the building, "round which so eager a crowd is collected?" "That is the great diamond—the Koh-i-noor, as it is called—once the boast of some Great Mogul, now the property of the Queen of England." "Oh! And what is that to the right, where a crowd almost as dense is congregated?" "They are the jewels of the Queen of Spain." "And on, further to the left, I see another crowd into which it is hopeless to penetrate." "They surround the blue diamond, that has been valued at I know not how many thousands of pounds." "The children!" cried Voltaire. Then turning to his professor, he added, "You who will make all classes reflective, pray begin with these gentlemen and ladies. When your celebrated navigator, Captain Cook, visited the savage islanders of the Pacific Ocean, he gave them glass beads in exchange for solid provender. We smile at the simple savages. They were reasoning philosophers compared with our lords and ladies. The glass bead was not only a rarity; it was a novel and curious production to the savage. A precious stone is no longer a novelty to any of us; and for the very important purpose of personal ornament it may be easily imitated or substituted. I defy you to find another element than simple ostentation in the extreme value we put upon our glass beads. They are merely the insignia of wealth. The children!—but men always have been, and always will be, children. I have frequently said it of my own Parisians, and, between ourselves, never liked them any the less for their being the most perfect children on the face of the earth."

Our visitor moved on to that end of the building which, to us, bears the name of the foreign quarter. He was not a little surprised to see the extremely tasteful and artist-like display which Austria and Bavaria made. A certain Parisian, thought he, once asked if it was possible for a German to have wit; at all events no one will ever ask whether it is possible for a German to have taste. And the descendants of his favourite, Czar Peter, did not fail to attract his attention. They, too, are running a race of luxury and civilisation. He entered into the little sculpture gallery of the Milanese and other Italians. There was the usual medley of subjects which a sculpture gallery always presents. Eve, the Christian Venus—Venus Repentant, as she might be called—here has a charming representative. Not only the expression of the face, but of the whole attitude, tells the sad history. She sits looking down, and shrinking within herself, as

if she would contract herself out of sight, if it were possible. Opposite is a head of Christ. Our critic paused with reverence before it; but an involuntary smile rose to his lips, as he observed that the artist, in his endeavour to make the head more and more placid and patient, had at length sent it fairly to sleep. Near it were Leda and her Swan, and Danäe waiting for her double shower of love and gold. Such is the medley we are always doomed to encounter in any collection of sculpture! From this Milanese gallery he hastened to the room devoted to English sculpture, that he might compare the genius of the two nations. The sculpture of the whole Exhibition—that which is displayed as pure art—is but of a secondary character; but our visitor found as much to please him in this room as amongst the Italians. Here were the lost children in the wood, whom the little birds covered with leaves. The poem is known throughout Europe, and the artist has translated it most faithfully into marble. Here is a mother or a nurse with a child, the child they call Bacchus; and Voltaire recognised with delight the Ophelia of Shakspere. Here she stands, leaning on the branch that will treacherously precipitate her into the stream; and the artist has, with singular felicity, succeeded in portraying, not only the beauty and the sorrow, but the bewildered mind of the love-lorn damsel. In the corner stood a head, designated *Il Pensieroso*, which, if the police had not been so vigilant, our visitor might have been tempted to purloin. Traversing the building, he soon returned to that part where his own countrymen especially make so great a display with their jewellery, their bronze clocks, the gilt ornaments of every description, their silks and velvets, and every article of luxury. He kindled for a moment with a sentiment of patriotic pride, as he noticed here the eminent position of his own France. Seeing so large a display of these articles, he asked one of his countrymen what could have induced him and others to bring so great a number of these costly products accross the Channel. What could have been the motive, he asked—was it honour or was it profit? "Both," was the reply. "We bring to exhibit, and we bring to sell. It is pleasant to take the conceit out of our neighbour, and his money at the same time." "But what has induced your neighbour to invite you here, with all these splendid silks and trinkets?" "*Ma foi!* I know not. Perhaps he wanted a lesson in good taste, and was willing to pay for it. If you look down the building you may catch, even at this distance, a glimpse of the gewgaw splendours of Birmingham. With an unlimited supply of tinfoil, a North American savage would do better." "Ha! monsieur, you must instruct your neighbour, and he, as is just and fit, will pay for his instructions."

Voltaire had no sooner ceased speaking than he found himself revolving a more serious train of thought. He sat himself down on a bench, and surveyed as much as he could, at one glance, of the whole building and its contents. "The industry of all nations!" thought he. "It is well; but what I see here most prominent, is the luxury of all nations. Did England really need a lesson in luxury? And if her taste in jewellery and upholstery has been defective, is any very great end answered by highly cultivating such a taste? What other countries may learn from England I know not; but she herself can learn nothing from this Great Exhibition but the lesson my countrymen are so willing to teach her: she can learn only how to spend her money in objects of luxury, in what they call ornamental and decorative art. Pure art I honour;" thus he continued his soliloquy. "I honour all the fine arts. From the man who designs a temple to him who engraves a gem; I honour all who contribute to the cultivation of the mind through the love of the beautiful. Men must have emotions for the soul, as well as food for the body; and if they do not find these in poetry, in music, in painting, they will seek them exclusively in those gloomy superstitions which afflict while they agitate, and render men morose and uncharitable. I honour the arts, and I

respect also every useful manufacture which adds to the comfort of daily existence; but there is a province of human industry lying between these two, which is neither fine art nor useful manufacture, which I do not honour, for which I have no respect whatever—ornamental nonsense, for which I feel something very near akin to contempt. Men decorate their houses and their persons with costly fooleries. I put my elbow on the mantelpiece, and am in danger of precipitating some china mannikin. Huge vases encumber the floor, which never held, and never will hold, anything but the chance dust that is swept into them. Absurd tables are set out to be covered with knacks and toys, that have not even the merit of amusing a child. The fingers are squeezed into rings; holes are made in the ear for the jeweller's trinket; there is no end to the follies committed in what is called decoration and ornament. Say that such things must be, is it a purpose worthy of the energies of a great people to increase and spread abroad the taste for fantastic upholstery and useless china, and all the imposing splendours of the haberdasher and the silversmith? Is it a very magnificent project to invite competitions in lace and embroidery, and or molu, and all the sumptuous trivialities of a lady's boudoir? Art! art! exclaims one. Do you value as nothing the art bestowed on these articles? Not much. If you model a human figure, of man or woman, let it be done for its own sake. A true work of art is a sufficient end in itself. Must I have the human figure scattered everywhere upon every utensil I possess! Can I not have a time-piece but a naked woman must sprawl upon it? Is this doing honour to the most beautiful of forms, to make it common as the crockery or drinking cup it is called in to ornament? Must it support the lamp upon your table, or be twisted into the handle of a teapot? If I pour water from a ewer into a basin, must I seize a river-god by the waist? Have you nothing better to do with the head of a man than to model it upon every prominence, fasten it upon the lid of your coffee-pot, or squeeze it under the spout of your jug? In all this taste I find little else than mere ostentation. Would you have sumptuary laws? says one. No; but I would have a sumptuary opinion, if there was any getting it."

A part of this soliloquy had been unconsciously uttered aloud. "It all does good for trade," said a bluff neighbour who had overheard him; "rich men should spend their money." "Not exactly upon absurdities, I suppose." "Anyhow they should spend their money. I am a tradesman—a Manchester man; I care nothing for these fine things myself, but I say, that rich men ought to spend their money." "And whether the articles can be of the least service to them or not?" "It does good for trade all the same." "Not all the same. Suppose he lent it to a respectable capitalist like yourself, a Manchester man, who would employ it in some useful manufacture, in multiplying articles of substantial service to mankind, of which there is still by no means a superfluity, would not this be doing good for trade, and in a better manner?" "Ay, ay! and bring him a good per centage for his money. You are right there. Beg pardon, sir, but you are not such a fool as I took you to be. Let the nobleman have his grand house and his garden, his pictures and statues, but if he has more money than he knows what to do with, let him lend it to the industrious capitalist, who will multiply useful things for the community at large. Profits, to be sure, would be somewhat less, but everything would be cheaper. I see, sir, you are no fool." Voltaire, bowing in acknowledgment for the compliment he had received, rose and threaded his way through the crowd, passing the gold and velvet of Persia and Turkey and India, and not forgetting to pay his respects to the Chinese. Other people cultivate the beautiful, or intend to do so; it is fit, thought he, that there should be one people who cultivate the ugly, the monstrous, the deformed, and with whom the grotesque stands in the place of the graceful.

What our visitor thought of all the various works of art he encountered, as well gigantic as minute—the Amazon, the lion, the archangels, who in several places are killing Satan or the dragon, with the utmost calmness, and with the least effort in the world, it were too long to tell, even if his criticisms were worth preserving. We follow him into what is called the Mediæval Court. Here altar and crucifix and sacred candlestick, and all the paraphernalia of Roman Catholic worship, arrested his attention, and somewhat excited his surprise. Well, said the philosopher to himself, I have always remarked that the spirit of trade is an admirable counterpoise to the spirit of bigotry. I have heard of the English people making idols for exportation to heathen countries; dealing with them as articles of commerce. They despatch a vessel to some barbarous coast, and in the cabin they carry out a missionary and his tracts, to convert the inhabitants, and in the hold they have an assortment of idols from Birmingham to compete with the native manufacture. Nothing so liberal as the spirit of trade. Now, here these English Protestants are making what they think most superstitious implements for the benefit of some Roman Catholic neighbour. "Pray," said he, addressing a sleek stranger, whom he thought likely to give him the required information, "Pray, for what country may these be intended? France can supply herself; to what people do you export them?" "Hush! They are not for exportation," said the grave gentleman, casting his eyes down upon the ground, and speaking in a plaintive and subdued voice. "They are for the English themselves." "But the English are Protestants." "Say rather Anglo-Catholics. But they are returning, slowly and doggedly, to the true fold. You, who are a foreigner, will be rejoiced to hear this." Voltaire took largely of his snuff. "If it pleases you, I will be rejoiced. They will read my *Cyclopedia* now. At last I shall be understood in England." * * * *

Our philosopher now makes his escape from his theological friend, and again plunges among the machinery, where he still finds his professor of mechanics, with whom he enters anew into learned disquisition; in the middle of their argument, however, the professor, for some incidental purpose, lit a common lucifer match. Voltaire had never seen the like before. He begged the experiment to be repeated. He examined the simple apparatus minutely; and asked for the old flint and tinder-box, that he might make comparison between them. They smiled at him. Such a thing did not exist. "Here is an invention," he cried, "which, as a real contribution to the comfort of life, far surpasses everything I have seen. Oh Lucifer! as they call thee, thou son of the morning, if I had had thee in a box by my bedside, how many hours should I have saved! how much anger and impatience should I have escaped! and François, how thy knuckles would have been spared! Verily, this is the greatest invention that has been made in the world since I—" But seeing that he was attracting to himself a degree and kind of attention from a staring and tittering audience, that was by no means agreeable, he broke off. Meanwhile, the professor, who talked on as incessantly and unweariedly as if he too were set in motion by the steam-engine, had already commenced his eulogium upon another instance of our mechanical invention. This time the machine was one calculated to interest Voltaire. It was a printing-press of the latest construction, worked of course by steam. He saw it in full operation. The type was arranged upon a large upright cylinder; four smaller cylinders, placed around it, bore the paper and carried off the impression from the types. At every revolution of the large cylinder, four sheets of printed paper were consequently delivered, for the edification or amusement of the world. Our ex-author watched the process, and was very much disposed to call for pen and paper, that he might give some *copy* to the machine. The professor continued his oration. "By a machine of this description, but of still greater power," he said, "the *Times* newspaper is printed, I tremble to say how many thousands in an

hour. Each paper contains matter that would fill an octavo volume. The debates in parliament that may have been heard at two o'clock in the morning, are that same morning laid on the breakfast-table of the country gentleman who is residing one hundred miles from the House of Commons. And not only have the speeches been reported and printed, but they are accompanied by well-written comments of the editor. Wonderful celerity!" "I hope," thought our listener, "that the orations are equally wonderful. They should be. From what I remember of such matters, I think I could wait a few more hours for them without great impatience; and perhaps the well-written comments would not suffer by the delay." Quitting the lecturer and the scene of his glory, Voltaire mounted the gallery. Here he encountered what, for a time, entirely subdued the captious spirit, and called forth all the natural energy and enthusiasm of one who had been poet, wit, and philosopher. This was the electric telegraph. He could scarcely contain his enthusiasm as he watched the index on one dial-plate, and saw the movement responded to by the index of a corresponding dial, and reflected that no conceivable length of distance would render the operation less certain or less instantaneous. Thought travels here with its own rapidity; manumitted from the trammels of space and time. Yet, after all, he added, it can be but human thought that travels on the wire.

Stepping on a little further, he found himself surrounded by improved fire-arms, muskets that would kill at the distance of five hundred yards, and many-barrelled pistols, which promised to deal half-a-dozen deaths in as many seconds. The cynical humour returned. "They are not all messages of peace and love," thought he, "that yonder electric telegraph will be employed to communicate. The old game of war is played at still, and, like the rest, duly provided with improved implements. And what is it I read on this label? 'A pair of duelling pistols.' Duelling, by the law of England, is murder. It must be a very dead law, when, in this industrial exhibition we have 'duelling pistols' thus distinctly labelled. 'Pistols for committing murder!' would have been rather a startling designation. It seems, therefore, that, in the public opinion, duelling is just where it used to be, just the same honourable custom, where men contrive to mingle in exquisite proportions the foolery of coxcombs, and the ferocity of savages. The progress seems to be all in the mechanical department." Our hero next encounters a Socialist and a member of the Peace Society, with whom he has a long and animated discussion. With his usual volatility, however, he abruptly breaks away from his adversary, and nimbly retraces his way along the gallery. In his haste he entered, unawares, into a wooden case, or closet, where there was exhibited an anatomical model, in wax, of the human figure. It was the size of life, and stood upright, with the breast laid open, exposing for convenient inspection the heart and liver, and all the other great viscera of the human frame. "Ha! ha!" he cried—"No change here. The same as ever—heart, stomach, and the rest of us; the same creature they laid in the pyramids, and burnt upon the shore, and deposit now in deep holes in the earth. No alteration here. Oh, those bowels! how often did they afflict me!" Apropos of burying, he was involved soon after in the examination of a new design for stowing away the increasing multitude of our dead. It was the model of a pyramid, to be erected of the same size as the greatest of the Egyptian pyramids, but to be erected after a very different fashion. For whereas the ancient pyramid was an encasement of stone enclosing the coffin of one man, in the modern pyramid every stone might be said to contain its dead. The area would be first covered with vaults built close to one another, on these a second area of similar vaults would be constructed, on these a third rising gradually to an apex. The project had something in it to please a reflective mind. How the two structures would contrast—the despot's pyramid and the democratic pyramid! What admirable

types they would form of the two forms of society, the memory of which they would severally perpetuate! In the one a people of slaves build an enormous mausoleum for one man, who is, as it were, a representative of the whole; in the other, a nation of freemen construct an eternal monument for themselves, simply by each man lying down in his place as he is called. * * * * * Spirit as he was, our visitor at length began to find himself exhausted by the multitude of objects which solicited his attention. He had seen enough, he thought, for one visit. But in quitting the Crystal Palace, the model lodging-houses erected by Prince Albert caught his eye. "This Prince Albert!" thought he; "I hear a great deal of this prince, and from all I hear there has not been on or near a throne, for many an age, so intelligent and accomplished a man. One must go very far back in the annals of England to find his parallel. This prince has equal intelligence and far more knowledge than my Frederick of Prussia, and Frederick could be a—— But I have forgiven him. Moreover, I had my revenge; after which one very sincerely forgives. Into these lodging-houses that bear the prince's name I must make some inquiries." He did so, and that with a rapidity and acuteness which soon put him on a level, in point of information, with the rest of the spectators. A prospectus of the society for building a better order of houses for the workman and the peasant was put into his hand. It did not fail to meet with his most cordial approbation: it was a scheme of judicious philanthropy worthy of its royal and enlightened patron. As he was withdrawing his foot from the step of the model cottage, he met, for the third and last time, the professor of mechanics, who here also was indefatigable in explaining and developing. Observing Voltaire, whom he now regarded in the light of an old acquaintance and antagonist, he determined to push the advantage which their present subject of examination gave him, and he enlarged triumphantly on that philanthropic desire which had lately sprung up in the higher and middle classes of the community, to improve the condition of those who occupy a lower place in the social scale. * * * A hot dispute follows, in the course of which the professor becomes extremely irritable, and at length was about to overwhelm his ghostly antagonist with a burst of honest indignation, when he discovered, to his surprise, that his opponent had vanished from the scene. Voltaire went back quite contented that he had lived in Paris a century ago.

CHAPTER VIII.

MODERN PORTRAIT PAINTING—ITS DEFICIENCIES—PRÆ-RAPHAELITES—PORTRAIT PAINTING IN QUEEN ELIZABETH'S TIME—WINTERHALTER'S PORTRAITS OF THE QUEEN AND PRINCE ALBERT COPIED ON CHINA—BRIEF MEMOIR OF THE QUEEN AND PRINCE ALBERT.

Portrait Painting in modern times has undergone a considerable change; rigid truth has been laid aside for flattery, individuality has been generalised, age concealed, and all prominent peculiarities softened down and almost obliterated; plainness of features, though stamped with intellect, is abhorred by modern art as a crime, and must not be represented, so fastidious has the age become. Perhaps it will be one of the best results of the Præ-Raphaelite school to bring back the style of our leading portrait painters to the sobriety of truth. We want the express image, the *alter idem*, of such personages as are eminent in rank or talent, with all the sharpness of nature's coinage impressed upon the visage. If we have lost in one respect, however, we have gained in another—we have improved in elegance and simplicity; we no longer bedeck our female portraits

Albert

Engraved by D. Pound, from a Daguerreotype

Victoria

with all the feathers, and lace, and pearls, and jewellery that it is possible to load them with; neither do we pourtray our belles as Dianas arrayed for the chase, as Bellonas with spear and helm, or as piping shepherdesses with a lamb and crook. Let us peep into Hampton Court, and see the Virgin Queen, exhibited in every stage of life from infancy to age, and loaded alike in all with extravagant profusion of dress and ornament. At the same time the artist was rigidly exact in point of resemblance. It is curious to observe the difference between the poets and the painters of that period in their descriptions of royal personages. While the former launched out into the most extravagant praises as to their personal charms, their youth, their beauty, and their noble qualities, the latter, severely true, represented them precisely as they were. From the poetry of Spenser, Sir Walter Raleigh, Sir Philip Sidney, and others, one would imagine the beauty of an Aspasia outrivalled, the graces of a Helen eclipsed. But Holbein and Zucchero have given us very different ideas; they have faithfully and honestly done their best to immortalise the lineaments of their royal mistress, in colours as true as they deserve to be lasting. We feel grateful, too, that bluff old Harry had no courtly flatterer—no Sir Thomas Lawrence of the day—to soften down, to generalize his stalwart proportions, or to idealize his countenance. He stands before us with his bold swagger, and all his characteristic qualities, such as they were, unmistakeably delineated in his features. Again, in the cold and unbending severity of the "Elizabeth" of the same painter, who can recognise the "Gloriana" of Spenser, the unrivalled paragon of perfection, so celebrated in the poetry of the times. In fact, in his courtly adulation, in his disregard to truth, the portrait painter of the present day has lost ground, instead of advancing in his art, and will, consequently, have less claim upon the respect of future generations, who would prefer, one would imagine, to see their ancestors as they really looked and moved, and not as if their features were softened down and corrected according to Gay's precept in the fable, from the Apollo and the Venus in the studio of the painter. But it is time for us to leave the court of "Gloriana," and that of her august sire, and turn our attention to our own gracious Sovereign, whose portrait, with that of her illustrious Consort, we have the pleasure of presenting to our readers. They were both objects of much attraction in the Crystal Palace, and were painted on china, after the originals, by Winterhalter; that of the Queen having been executed by Madame A. Ducluzeau, and its companion by M. Antoine Beranger, of Paris; and to both of these artists was awarded the honourable distinction of a prize medal. As a fitting accompaniment we subjoin a brief memoir of the illustrious pair. The language of eulogy, when applied to kings and queens, generally becomes a direct falsehood, or subsides into unmeaning commonplace. The graceless Charles II. was "our most religious king." The royal libertine, who spurned from his home and heart, and consigned to an early grave, the wife he had sworn to cherish and protect, was hailed as "the first gentleman of the age;" and thus it has ever been. In the eyes of the world the graces of royalty amply compensate for its vices. When royalty is spoken of, the language of flattery only is heard; the censor speaks with bated breath. And thus the difficulty is increased when, as in the case before us, the voice of praise is but the voice of truth.

In our sketch—as is but right—we must give the first place to our Sovereign Lady, Queen Victoria. The incidents of her life may soon be told. Her father was his Royal Highness Edward Duke of Kent, fifth child of George III. Her mother was Victoria Maria Louisa of Saxe Coburg Saalfield, and was born at Coburg on the 17th of August, 1786. In her sixteenth year this amiable princess became the consort of the hereditary Prince Leiningen; but after the birth of two children she became a widow, and was married to the Duke of Kent on the 29th of May, 1818, with all due splendour, at Coburg, in conformity with the Lutheran rites. The illustrious couple immediately set

out for England, and on arriving at Kew palace, the marriage ritual was again performed according to the service of the Church of England. "This," says a writer in the *Annual Obituary* for 1821, "must be allowed to have proved a fortunate, for it was a happy union. They exhibited towards each other the most marked attention and regard." The result of this union was the birth of her most gracious Majesty Queen Alexandrina Victoria the First. In eight short months the mother was again a widow. The Duke of Kent expired on Sunday, the 28th of January, 1821, one week previous to the demise of his royal father, George III. The childhood of the princess was passed under the guardianship of the Duchess of Kent, who, in every respect, appears to have been well qualified for the task. The Queen's governess was the companion and friend of the duchess, the Baroness Lehzen; and one better adapted for fulfilling the duties of her situation could hardly have been selected. The princess was early taught to consider herself as the possible future depository of a trust to be exercised only for the good of the whole community; and when, in the course of time, the succession to the throne became no longer a matter of speculation, the additional aid of the late Bishop of Salisbury, subsequently assisted by the Archbishop of Canterbury and the Bishop of Lincoln, was invoked. At the age of nine years the princess had made considerable progress in the ordinary branches of polite education. She could understand the French, Italian, and German languages. But her *penchant* was evidently for the fine arts, more particularly music, for which, from her earliest childhood, she displayed considerable taste. We are told, on one occasion, the first, we believe, of the kind—Beethoven's celebrated "Hallelujah to the Father," being performed before her royal highness,—when that beautiful passage, "The exalted Son of God," burst upon her astonished ear, she manifested very great emotion. For several minutes after the conclusion of the chorus her royal highness seemed spell-bound, as though a new theory had suddenly been propounded to her imagination; and it was not till the expiration of some minutes, during which she seemed insensible to all around her, that she was able to give expression to her feelings of delight. A letter describing the confirmation of her Majesty, which took place July 30, 1835, may not be deemed uninteresting. "I witnessed," says the writer, "a beautiful touching scene the day before yesterday, at the Chapel Royal, St. James's—the confirmation of the Princess Victoria by the Archbishop of Canterbury. The royal family only was present. The ceremony was very affecting: the beautiful, pathetic, and parental exhortations of the archbishop, on the duties she was called on to fulfil, the great responsibility that her high station imposed on her, the struggles she must prepare for between the allurements of the world and the dictates and claims of religion and justice, and the necessity of her looking up for counsel to her Maker in all the trying scenes that awaited her, most impressive. She was led up by the king, and knelt before the altar. Her mother stood by her side, weeping audibly, as did the queen and the other ladies present. The old king frequently shed tears, nodding his head at each impressive part of the discourse. The little princess herself was drowned in tears. The ceremony over, the king led her up to salute the queen and the royal duchesses present."

The following authentic fact exhibits a most gratifying feature in the character of her Majesty. A man named Killman, who served in the capacity of porter to the late Duke of Kent, had a daughter much afflicted and confined to her bed. On the evening of the late king's funeral, this young woman received from Queen Victoria a present of the Psalms of David, with a marker worked by herself, having a dove, the emblem of peace, in the centre, placed at the forty-first Psalm, with a request that she would read and derive from it the consolation it was intended to convey. The Queen is said to be passionately fond of children. The following anecdote went the round of the news-

papers some few years since as an illustration. Her Majesty commanded Lady Barham, one of the ladies in waiting, to bring her family of lovely children to the palace. They were greatly admired and fondly caressed by the Queen, when a beautiful little boy, about three years of age, artlessly said, "I do not see the Queen—I want to see the Queen;" upon which her Majesty, smiling, said, "I am the Queen," and taking her little guest into her arms, repeatedly kissed the astonished child. We give one more anecdote, as an instance of her Majesty's religious feeling. A noble lord, in this respect very unlike her Majesty, arrived at Windsor recently late on Saturday night. "I have brought down for your Majesty's inspection," he said, "some papers of importance; but as they must be gone into at length, I will not trouble your Majesty with them to-night, but request your attention to them to-morrow morning." "To-morrow morning?" repeated the Queen; to-morrow is Sunday, my lord!" "But business of state, please your Majesty"—"Must be attended to, I know," replied the Queen; "and as, of course, you could not have come down earlier to-night, I will, if these papers are of such vital importance, attend to them after we come from church to-morrow morning." On the morrow, much to the surprise of the noble lord, the sermon was on the duties of the sabbath. "How did your lordship like the sermon?" inquired the young Queen. "Very much, your Majesty," replied the nobleman, with the best grace he could. "I will not conceal from you," said the Queen, "that last night I sent the clergyman the text from which he preached. I hope we shall all be the better for it." The day passed without a word on the subject of the papers of importance, and at night, when her Majesty was about to withdraw, "To-morrow morning, my lord," she said, "any hour you please, as early as seven if you like, we will go into these papers." His lordship could not think of intruding at so early an hour on her Majesty; "nine would be quite time enough." "As they are of importance, my lord, I would have attended to them earlier, but at nine be it." And at nine her Majesty was seated ready to receive the nobleman, who had been taught a lesson on the duties of the sabbath, which it is to be hoped, he did not quickly forget.

But we must return to our narrative. On the decease of her uncle, King William IV., June 30, 1837, her Majesty succeeded to the throne. On the 21st of the same month she was proclaimed, and on the 28th the ceremony of her coronation was performed. But we now come to an event of more importance—her marriage with Prince Albert, which took place February 10, 1840. It is time that we say something of the Prince, who is the husband of our Queen, the father of our future kings, and to whom we are indebted for the idea of the Great Industrial Exhibition. His Serene Highness Prince Albert Francis Augustus Charles Emanuel, Duke of Saxe, Prince of Saxe Coburg and Gotha, was born on the 26th of August, 1819, and received the first rudiments of education in the Castle of Erenburg. His father was one of the numerous honorary princes with which Germany abounds. Before the French invasion there were 300 of these principalities. At the Congress of Vienna, however, their number was reduced to 38. Besides its separation into states, Germany was divided by Wenceslaus, in 1307, and by Maximilian, in 1500, into nine grand sections, called circles. Of these two are comprised in Saxony Upper and Lower. In Lower Saxony we find Coburg Gotha, a territory not very large, but very much improved since the accession of Prince Albert's family. It is the most southern of the Saxon independent states, and is surrounded by Schwartzburg, Meiningen, Hildeburghausen, and Bavaria. The valley of the Itz forms the greater part of its territory. The Thuringian mountains stretch along the northern boundary of Coburg, which is only about one-fourth larger than Rutlandshire, having an area of not quite 200 square miles in extent. Joined, however, to Gotha, the territory of the duke equals in size the county of Dorsetshire, having a surface of a thousand square miles.

Much of this is covered by mountains and forest land. As to Prince Albert's family, we may here briefly state that the Duchess of Kent is his aunt, and Leopold, King of the Belgians, his uncle. We may further state, that some of his ancestors were noticeable men. In the dimness that overhangs the days of Charlemagne, we faintly perceive a Saxon chief named Wittekind, who for thirty years defied that prince's power. From his loins sprung the race of which Prince Albert is a younger son. All readers of Luther's life know how he was befriended by the Elector of Saxony, Frederick "the Wise," John "the Constant," and John Frederick, "the Magnanimous." Prince Albert boasts these men as his ancestors. Their blood floats in his veins, and he is true to the faith they held. We have already stated that Prince Albert received the rudiments of his education in the Castle of Erenburg. His masters were chiefly selected from the College of Coburg, and his proficiency was of the most signal character. After the death of Prince Albert's mother, Dorothy Louisa Paulina Charlotte Frederica Augusta, daughter of Augustus, the last duke but one of Saxe Gotha Altenberg, while his father was engaged in arrangements for a second alliance, it was thought expedient that the Prince should be removed for a time from home, and he became the visitor of her Royal Highness the Duchess of Kent, and the fellow-student of the young Princess, whose heart and hand he was afterwards to share. Who knows but that the seeds of that attachment were then sown which rendered the after marriage of so different a character to what royal marriages generally are! Be this, however, as it may, Prince Albert, who had completed his eleventh year, partook of the lessons in the English language, music, and the various sciences, which were given to his illustrious cousin. Fifteen months were thus spent, when, after his father's second marriage, he returned home. So assiduous was the Prince in his application to study, that at the age of seventeen he passed with *éclat* an examination which admitted him into the University of Bonn, where his education was completed, and where, owing to his amiable manners and propriety of conduct, he became a general favourite.

When, at the close of his university career, Prince Albert returned to his father's court, the inhabitants of the duchy vied with each other in doing honour to the event. His entry into public life was celebrated by poems, balls, illuminations, and rejoicings of all kinds. Soon after the Prince paid a second visit to this country. The occasion was the coronation of her Majesty. Amongst the guests brought together by that event, were no visitors more popular than the Prince and his illustrious sire. On his return the Prince prepared for a tour in Italy, where he spent the winter of that year. Already it is probable that the event which was to raise him to so high a rank was in contemplation. It is said, on his return from Italy, the first object that met his eyes on entering his apartment, was a portrait of her Majesty, which had, during his absence, been sent over for his acceptance from the Queen. At any rate, coming events did cast their shadows before. Hints were dropped by our "own special correspondent," and at the beginning of October, 1839, Prince Albert embarked with his brother, Prince Ernest, for his third visit to London. During this sojourn all doubts were put to flight, and on the 2nd of November following, her Majesty, at a court held at Buckingham Palace, declared that the Prince was the husband of her choice. The course of royal love did run smooth, and on the 10th of February, 1840, the service, read alike over the highest and the lowest in the land, joined together the royal pair. The issue of that marriage are—1, Victoria Adelaide Mary Louisa, Princess Royal, born November 21, 1840; 2, Albert Edward, Prince of Wales, born November 9, 1841; 3, Alice Maud Mary, born April 25, 1843; 4, Alfred Ernest Albert, born August 6, 1844; 5, Helena Augusta Victoria, born May 25, 1846; 6, Louisa Carolina Alberta, born March 18, 1848; 7, Arthur Patrick William Albert, born May 1, 1850. And whilst we are yet writing,

the birth of another prince is announced to us by the joyful firing of cannon on the occasion.

Prince Albert's fame preceded him on English ground. We had heard of him as a scholar, and a ripe and good one. A fellow-student of the Prince at Bonn, in a letter published in the *Times*, stated that the Prince was not only conversant with several European languages, but that he was deeply learned in the classics—that when at Bonn he had published an elegant volume of lyrics for the benefit of the poor—that his skill in painting was also considerable—and that in the composition of several songs he had shown himself a good musician. Proofs of these qualities have now become familiar enough. We were prepared for them, and not surprised at the manifestations of them; but we were not prepared for the untiring philanthropy, for the graceful domestic life, for the greatness of aim, evinced by Prince Albert. For the birth and realisation of that great idea which, more than any event in our own time, has aided progress, and has prepared the way for the brotherhood of man, the world must ever hold in veneration the memory of the Prince. No prouder monument could man desire. When the pyramids shall have crumbled away—when the monumental brass shall have decayed —when London shall be what Tyre and Sidon are now—still 1851 will be memorable in the annals of the world; and labour's sons will remember, as they toil at the loom, or the forge, or the plough, or the mine, who it was that vindicated for labour her proper place in the breasts of men—who it was that asked the world to do homage to peace and its attendant arts. With all our great institutions—with all our national celebrations—with all our national sympathies—have the names of Victoria and Albert become entwined. When revolutions raged in neighbouring lands—when blood was spilt in Vienna, in Paris, in Berlin—when thrones tottered to their fall—in our land peace and order remained secure. The future historian will have to tell how, when Victoria went amongst her people—whether she visited the cotton-spinners of Manchester, or the peasantry of Buckinghamshire, or in the presence of the denizens of every clime, in fitting manner, with the organ's peal and the voice of prayer, opened the Crystal Palace—all along the way glanced eager and admiring eyes, and everywhere were the teeming manifestations of a nation's loyalty and love. Already an inscription commemorative of the virtues of our Queen has been written by our poet-laureate. We extract from it the following appropriate lines:—

"Her court was pure; her life serene;
God gave her peace; her land reposed;
A thousand claims to reverence closed
In her as mother, wife, and queen.

She brought a vast design to pass,
When Europe and the scattered ends
Of our fierce world were mixed as friends
And brethren in her halls of glass.

And statesmen at her council met,
Who knew the season when to take
Occasion by the hand, and make
The bounds of freedom broader yet

By shaping some august decree
Which kept her throne unshaken still,
Broad-based upon her people's will,
And compassed by the inviolate sea."

We are not afraid, however, of challenging comparison between these lines and the following, to the same august lady, from the fair friend who has already more than once enriched our pages with her poetic effusions :—

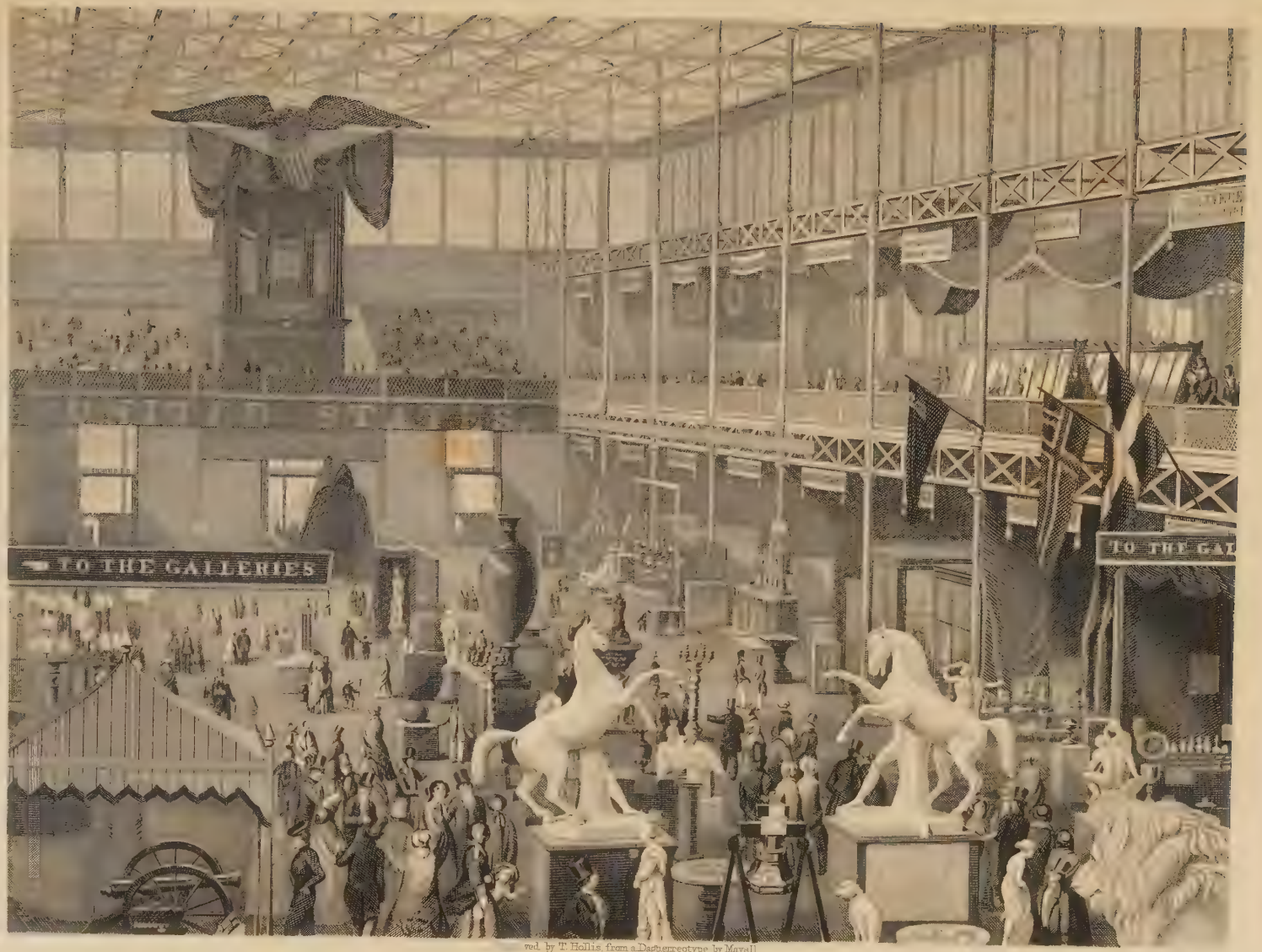
When first I gazed upon that beauteous brow,
  And thought how early it was doomed to wear
  That "polished perturbation, golden care,"
Men call a crown, I only wept—but now
Far other feelings bid my bosom glow;
  For thy sweet soul-enthralling smiles declare,
  O regal lady, excellent as fair,
The varied blessings which around thee flow.
  In virgin bloom beloved, as queen revered,
  As wife, as mother, more, still more endeared.
Long for thy happy people may'st thou live!
  As long thy gifted graceful consort prove
  How rich a boon thy pure, thy generous love,
The choicest treasure even *thou* couldst give.

CHAPTER IX.

LETTERS OF M. BLANQUI—*concluded.*

LETTER VIII.: AUSTRIA—IMPERIAL PRINTING OFFICE—MAPS—BOHEMIAN GLASS—THE CRYSTAL FOUNTAIN—AUSTRIAN TYRANNY. LETTER IX.: LYONS—GREAT VARIETY AND RICHNESS OF ITS DISPLAY — GOLD CLOTH—CHURCH ORNAMENTS—CRAPES—CRAVATS—PORTRAITS WOVEN IN SILK—TASTE OF THE LYONNESE. LETTER X.: MULHOUSE—MUSLINS, JACCONETS, ETC.—BRILLIANT DYES—ENGLISH AND FOREIGN FACTORIES COMPARED—MACHINERY VERSUS WORKMEN—GOLD AND SILVER WORKMANSHIP — ENGLISH AND FRENCH COMPARED — VARIOUS STYLES DESCRIBED—BRONZE CHASING.

Let us now once more turn to the agreeable lucubrations of our learned friend, M. Blanqui.—I cease for a while, he writes, my studies upon French industry, in order to treat of Austria and her exhibition. Austria occupies the third rank of this universal congress; and she has appeared with a display of resources which has surprised the whole world, except those who do not form their opinion from public report, and who do not judge of great states from pot-house prejudices. Austria has taken the Exhibition in earnest. She has appeared armed at all points, and every day the interest excited by her various products, which betoken an industrial progress worthy of the attention of manufacturing nations, is increasing. Commencing with the most liberal branch of industry—printing—I am glad to say, that the imperial printing-office of Vienna has exhibited the most complete collection of specimens of all known types. This collection, which contains no less than two hundred and six languages or dialects, from Phœnician characters, the most ancient in the world, down to Japanese, is the most beautiful in Europe. It is of itself a sufficient answer to the charge of love of darkness, so often brought against Austria, and which for a long time has only been deserved by her new government. Austria has now entered upon a new path, and although the statue of Marshal Radetzki, which seems to watch, leaning on a sword, over the deposits of Austrian wealth, may appear an emblem little in conformity with the industrial progress of that country, there is no other, after France and England, which merits in the same

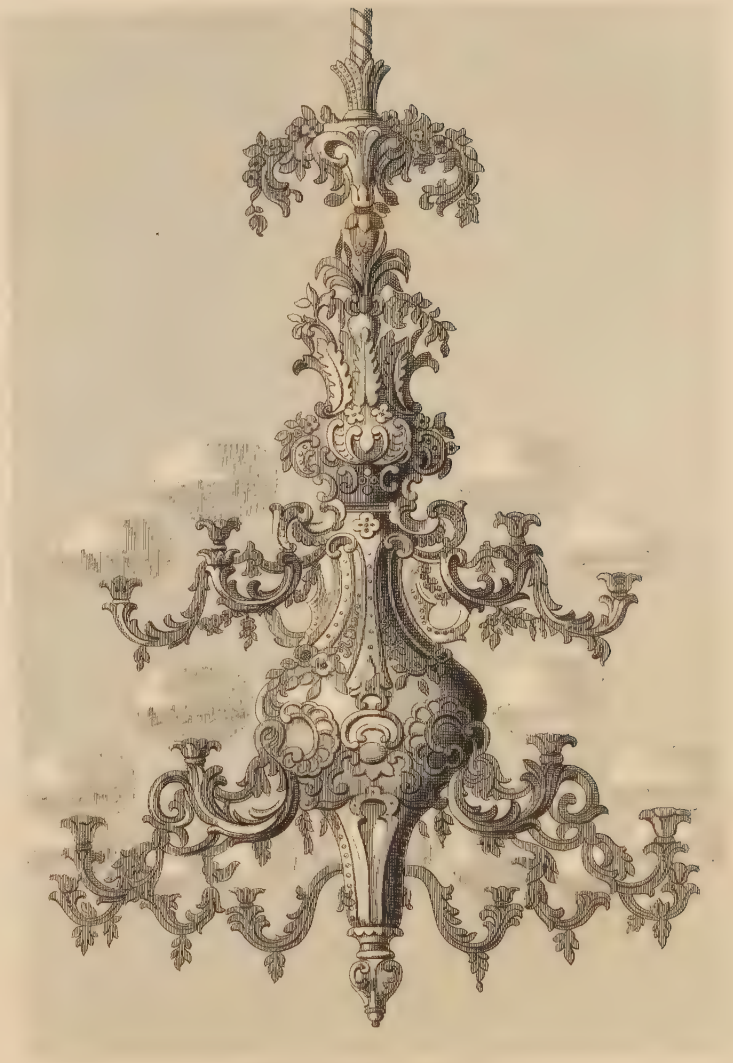


ved. by T. Hollis, from a Daguerreotype by Mayall

LOOKING EAST

Engraved by T. Hollis, from a Drawing by H. Mason

BOHEMIAN COLORED GLASS CANDELAB[illegible]



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degree the attention of the man of study and of labour. The homage rendered to science and to human intellect by the branch of industry most capable of propagating them throughout the world, is assuredly a remarkable fact. When we reflect upon the immense quantity of linguists, of professors, of compositors, and of able workmen, which such a luxury of typography evinces, it will suffice to show the rank occupied by Austria in the great European family. The imperial establishment of Vienna possesses all the types of the characters printed in its workshops, and it has even exhibited the matrices used in their manufacture. The ingenious invention, by means of which the 80,000 signs of the Chinese language are formed by moveable type like music, has been particularly noticed. In a technical point of view, the art which the Austrians have attained of calculating the space occupied by every isolated letter, enables them beforehand to know what will be the precise extent of a manuscript when it is printed, and the imperial printing-office possesses already 150 millions of letters founded upon this system. Oriental scholars have greatly admired a work printed for the first time in Japanese with moveable types, and which, from its perfection, would rather appear to have been imported from that country itself, than reproduced in Germany. Austrian typography has placed itself in the first rank, through this magnificent display of richness. It would require a volume to give the simple catalogue of all she has exhibited of this nature, and that volume would require a knowledge of the subject which I do not possess. I regret to say that the national printing establishment of France has limited itself by opposing to this dazzling array of typographical productions a solitary volume of specimens, which have unquestionably their merit, but which do not seriously represent French typography. Austria has also displayed much luxury in her topographical productions, and her maps, already very celebrated, have maintained at the Exhibition the distinguished rank which they merit. When we leave the department of science to enter into that of the industrial arts, we find that Austria is making sensible and continuous progress. She manufactures iron skilfully in her works of Styria, the products of which are excellent. She has almost supplanted the town of Nîmes in the exportation of common shawls. She manufactures with great superiority ordinary woollen cloths; and, notwithstanding the legitimate reproaches which may be addressed to her on the subject of taste, her furniture has produced a certain degree of sensation at the Exhibition, owing to the spirit with which it has been executed. A country which manufactures as many as eight millions of scythes and reaping-hooks for exportation only, is evidently organised for extensive industrial pursuits. But it is especially in Bohemian glass that we recognise one of the most marked superiorities of Austrian manufacture; and this is the place to say a word about the condition of the glass manufacture as shown at the Exhibition. Three powers had the right to figure there with their distinctive characteristics—France, England, and Austria. France has abstained from exhibiting. Our beautiful manufactories of St. Louis and of Baccarat, managed by protectionists as skilful as they are bigoted, have sent nothing, whereas they might have sent masterpieces, which are perfectly well known, for there is a magnificent collection of them at the Conservatoire des Arts et Métiers, at Paris. We do not even hesitate to say, notwithstanding the ill-feeling of these gentlemen, that this collection would have sufficed to beat out of the field all the rival collections; but then, at the same time that we should have demonstrated the superiority of the French glass manufacture, we should have asked with what right it dared to levy tribute on the national consumers, and show itself so eager for monopoly, with which it can dispense exceedingly well? This is what their absence will not prevent us from asking. Besides that this absence is a grave fault at a moment when the question is to defend the honour of national labour, it is likewise a useless precaution, because the object of this intentional desertion will escape nobody. It is shameful to

hide yourselves when you are accountable to your country for the efforts which it has so liberally made to sustain you, and you lose all right to boast of your superiority when you refuse to appear at a gathering like that of London. Away then, gentlemen, with your pretensions to prohibit in France the entry of the glass of Bohemia and of other countries! Away, shameful taxgatherers, who levy upon us, by means of prohibition, abusive imposts; and who do not wish any one to discuss the strange budget by virtue of which you make us pay so dearly for what we ought to have cheaply! The moment is approaching when all producers will have to submit to the natural reign of competition. We will gladly make sacrifices for the state which guarantees to us security, roads, justice, or government; but what do you insure to us, shameless monopolists? Yes, here you would have shone beyond comparison, if not through the cheapness of your products, if not through their colour, at least through their form. You would have been recognised as worthy to occupy a medium situation between England and Austria. England seems to have gained the palm for white, Austria for coloured glass. The gigantic English fountain, upwards of thirty feet high, whose waters diffuse throughout the transept of the Crystal Palace a delightful freshness, is a masterpiece which you have not equalled. The large pieces of red Bohemian glass, of which you feared the rivalry, have in reality over yours only the advantage of cheapness. You would have united nearly all the merit except that of sparing our purse. My learned colleague, Michel Chevalier, was right when he said, "France pays you the poor-rate, and she does not owe it you."

I was sadly afflicted to find under the Austrian flag the products of a considerable portion of Italy;—the silks of Milan, of Verona, the beautiful stained glass of Bertini, the mosaics—everything, in short, that is left of art and grace to these unfortunate Italians. Austria has exhibited very fine specimens of her mineralogical products. She shines less in her cotton goods, which she would do well to leave alone. It is now-a-days the error of great nations to desire to procure, at any price, by means of forced labour, that which they might acquire cheaply by means of their natural labour. The printed calicoes of Austria are very ugly, and badly finished, notwithstanding the abundance of chemical productions which are exhibited in her name. Chemical products have followed the progress of science in nearly all the countries of Europe, and as I find occasion to remark it here incidentally, I have obtained at Manchester authentic proofs of the remarkable change which has manifested itself in England. One of the most eminent calico printers has shown us by his books the price which he pays for various substances, all of which evince a very advanced state of manufacture. Upon the whole, Austria occupied a very distinguished rank in the Universal Exhibition. There is, in the almost encyclopædic collection of her products, something masculine and severe, characteristic of the nation itself—a dissimilitude in strength as there is a diversity of races in the empire. The Bohemians, the Hungarians, the Italians, the pure Germans, who have co-operated in forming the union of Austrian industry, have each unquestionably preserved their peculiar physiognomy, and have lost nothing by being associated together. It will be hereafter interesting to study the special character of the labouring populations of all the countries which have appeared at this Great Exhibition—French, English, German, Spanish, American, and Oriental. You will see what curious relations exist between the workman and the work, and how much the lot of the former is connected with the success of the latter. But who, until now, has occcupied himself to know exactly what is a workman? Workmen are flattered when they are strong—they are curbed when they abuse their strength; but to study them, to admonish them—who thinks of it.

LETTER IX.

I return, with the whole of Europe, to this marvellous exposition of Lyons, which will form an era in the history of industrial exhibitions. It is not sufficient merely to exclaim, like all the spectators, "Beautiful! magnificent! admirable!" it is necessary to enter into some details of this *event*, to analyze this catalogue of *chefs-d'œuvre*, and to attempt to make every one appreciate their import. The city of Lyons has not only outstripped all rival manufactories, if such there be—she has eclipsed herself; and you will be better enabled to judge of her strength from the simple fact, that only one-seventh of the Lyonnese manufacturers have presented themselves at the Exhibition; but these are the masters of the art. I have already told you that they had had the happy idea to lay aside their individualities for the purpose of appearing jointly. In truth, only one name is observed, that of the city of Lyons, which towers above all her products, and which appears to canopy them with her glorious renown. Union has constituted their strength, and these illustrious anonymous persons shine with a greater brilliancy than if they had posted up their own names. I could have wished that the Parisian furniture and paper-hanging manufacturers, imitating their example, had confined themselves to the following simple inscription: *Paris, Faubourg Saint Antoine.* That would have meant, "You take us for barbarians who only know how to destroy; behold how we work when we are not engaged in setting the four corners of Europe in a flame." And Europe would have answered, "Pray work, gentlemen; it is a great deal more beautiful."

Let us commence by doing justice to the two men who have presided over this brilliant Lyonnese exhibition, and who watch over it in London with paternal solicitude. They are Messrs. Arlès Dufour, member of the Lyons jury, and M. Gamot, inspector of silks. The one, full of fire, zeal, and ardour, is not an inapt representative of the operative impetuosity; the other, calmer, milder, and more thoughtful, resembles the genius of business. A goodly portion of the success of the great city is attributable to them, and it required not less than their united merits to bring to a happy issue this memorable exhibition, the preparations for which have not been unaccompanied with difficulties. I will describe to you how they have accomplished the delicate task which had been confided to them. They have collected under one head all the Lyonnese articles of the same description, without distinction of origin, and they have exhibited them in the best light. Thus, all plain fabrics are exhibited together, from the lowest priced to the most costly qualities. The cut or crisped velvets come next, followed by lutestrings, satins, and gros-de-Naples; then follow crapes, plushes, handkerchiefs, the figured and brocaded goods, and the fabrics used for churches and palaces. Every kind comprises all its varieties, and an attentive contemplation of the whole suffices to embrace, in the most complete manner, this immense family of woven fabrics which constitute the pride of the loom. We were the less prepared to admire what we are about to describe, inasmuch as the Paris Exhibition of 1849 had left in the minds of all an unfavourable impression of insufficiency and sorrow. It was evident that the city of Lyons had not figured in a manner worthy of herself at this industrial solemnity, and that she bore profound traces of the moral and political disorder caused by the events of 1848. I leave you to judge of the general surprise called forth at the aspect of the fabrics of incomparable richness and variety, which leave far behind them everything of the kind that has been attempted even in Lyons. Thus we may see, at the Crystal Palace, gold cloth with bouquets figured with silk, valued at 400 francs per metre, of workmanship so superior, that it may be considered as the most beautiful ever issued from the looms of Lyons.

Lyons has maintained and raised her old repute of her manufacture in fabrics for

church ornaments, and in woven and embroidered chasubles, with inlaying of precious stones. The figured goods naturally occupy in the Lyonnese exhibition the most important place, owing to the special character of their manufacture, the richness of their colours, and the grand beauty of their ornaments. It is from thence that all court robes, the princely hangings, and the decorations of the most splendid apartments, are sent forth. It will be a long time before we behold a more glorious industrial trophy than that of all these glorious evening dresses chosen among the *chefs-d'œuvre* of the loom, which represent the greatest difficulties overcome, together with the most delicate and most exquisite effects of pattern and mixture. There is not a nation in the world at present capable of uniting in the same degree the richness of material with the perfection of labour. Only one house has exhibited crapes—about seventy pieces—crisped crape, smooth crape, crêpe-lisse, *aerophane* crape, embroidered on white or in colours, of indescribable grace, lightness, and freshness. This department of the Exhibition is very dangerous for husbands. From morning till evening there are thousands of women in ecstasy, who laud them to the skies. It is, indeed, from the heavenly regions that these enchanting productions, variegated with a thousand colours, transparent and light, like the wings of the butterfly, would appear to have descended. Happy women of the earth! I cannot too often repeat it to you: when you throw over your beautiful shoulders these aërial scarfs, think sometimes of the poor girls who have made them. They are of your own sex, your own country, and your own religion; and they are often in want of the necessaries of life, after having provided you with superfluities! Not far from these treasures, the Lyonnese have exhibited an assortment of more than 200 pieces of cravats, neckerchiefs, and handkerchiefs—more durable and vulgar, but of which immense quantities are produced, and in the manufacture of which the Lyonnese industry has made considerable progress in the last fifteen years. Lyons has not excited less public attention by her three stalls of black plush for men's hats. Hats, such as are worn now-a-days in the shape of perfectly ridiculous cylinders, are very ugly, ungraceful, and incommodious; but they are not too dear; and it is owing to the improvements introduced in the manufacture of plush that we are enabled to renew them often and have them clean, until we wait the time that a form more rational and appropriate to our habits be given to them.

There is, in the Lyonnese exhibition, an article which it would be well to leave alone; these are the plain fabrics, with patterns printed in the warp, called *chines*, which have become very fashionable of late, though they but little deserve it. This bastard or misty style, very extensively used for ladies' dresses, imparts to the pattern something vague and stiff, which is contrary to the traditions of Lyonnese manufacture, so justly celebrated for the brilliancy and distinctness of its colours. Only one exhibitor has dared to compete with the Chinese crape shawls, and he has done wisely. The real China crape shawls are always a little heavy in their embroidery, even when the fabric upon which they are worked, which is seldom the case, is light. We may, therefore, attempt, with hopes of success, a competition which deserves encouragement. I may say the same of the special manufacture of silk cravats, in which the English excel to a degree to send a good many to the Parisian market. The watered silks exhibited are somewhat stiff, and are particularly suited to dowagers. There is another description exhibited, more rich than beautiful, and which is relieved, I might almost say inlaid, with gold and silver. The use of filigree wrought metals is only suited to the habits of the East. The Lyonnese shawls are going out of fashion, or are transformed, beaten out of the field, by the Parisian manufacture in point of elegance and materials, beaten by the printed shawls in point of economy, and by the fashion which is by degrees substituting the wrapper, the mantles, and wadded over-dresses, to everything that is not an Indian shawl. Lyons has exhibited figured shawls all of silk, and velvet shawls, for this winter, very

graceful and elegant. This is the inimitable stamp of Lyonnese manufacture, distinction, and elegance. I trust our English neighbours will pardon me, but all the printed shawls —real slop shawls—of which their women use such lavish quantities, would not be worn in Paris by respectable chamber-maids. It is with difficulty that such houses as M. Depouilly of Puteaux, Messrs. Gros, Odier, and Roman, of Wesserling, whose products are perfection itself, can obtain for their printed shawls a sale much more due to their lightness than to the purity of their printing. I shall only allude incidentally to a compliment paid to the royal family of England by the house of Potten and Rambord, consisting of three pictures, worked in silk by the loom, by the process of Maissiat, after Winterhalter, representing Queen Victoria, Prince Albert, and one of their children. There is also a portrait of the Pope, executed by the same process, from the manufactory of M. Coquillat. These pictures from the loom are veritable triumphs, which only tend to prove of what the shuttle is capable; but I do not admire them any more than the Gobelins pictures, which will never be industrial products, and which will always leave something to be desired as works of art.

That which, above all things, distinguishes the Lyonnese manufactures, is the supreme taste which characterises all its productions, like the natural element in which its workmen breathe; it is that series of traditions which neither the revolutions of fashion, the devastations of civil war, nor the savage distractions of politics, have been able to interrupt. There would appear to be a mysterious agreement among the innumerable hands which co-operate, often without knowing each other, in the perfection of these admirable fabrics. Warpers, designers, finishers, dyers—all lend each other, without effect and almost without method, mutual assistance. They produce masterpieces in the same manner as elsewhere vulgar things are produced, because it is their nature. Behold them at work: with what care they protect against the dust of the domestic hearth the immaculate whiteness of these satins, purer than silver—or of those crapes, the grain of which is produced by the pressure of a cylinder, covered with coarse leather, and rough to the touch! Nothing will be more interesting than the history of these men, when it shall be written with sympathy for them, without flattering or disregarding them. These men, at the present moment, demand their proper position; and they exhibit, as their title-deeds, the masterpieces which we have just admired. Have they deserved it or not?

LETTER X.

After the striking success of the Lyonnese exhibition, there is none comparable with that of the manufacturers of Mulhouse, who have also had the happy idea of appearing collectively, and whose products have excited universal admiration. Here, it is no longer by the richness of the material that the exhibitors have shone; it is by the elegance of their patterns, and, above all, by their splendid execution. Muslins, jacconets printed for gowns, printed cloths for curtains and furniture—these constitute the general staple of the Alsatian exhibition; but, with these simple articles, they have found the means of eclipsing all rival manufactures, and they no longer fear any competition. I do not think that I am unjust towards any one by asserting that the manufactures of Alsatia are the first of France, either as regards the importance of their own capitals, or those of the bankers who are interested in their operations. They have all taken manufacturing pursuits in good earnest, and do not devote themselves to them, like so many others, to make a small fortune, and then to retire into idleness. They live or die engaged in industrial avocations. The manufactories pass from father to son, constantly perfected by the intelligence of generations which succeed each other. At Mulhouse they study—they do not vegetate in the beaten track of routine; there are industrial and scientific

societies which endeavour every day to solve the economical problems of manufacturing labour, and which generally conduce to them by the most liberal means. What a difference from the exclusive, absolute, and prohibitionary manufacturers of the north! able men likewise, but untractable, and ever ready to regard their local interests as those of the whole of France. Alsatian industry was therefore destined to shine at the London gathering, and it must be admitted that it makes a better figure than that of Turcoing, Lille, and Roubaix, although these are represented by very honourable names, among which those of Messrs. Scrive, Frères, are foremost. Alsatia is a model manufacturing country. Machine manufactories, spinning, weaving, printing establishments—all are united there; it is the land of mechanists, designers, and chemists. Every especial degree of skilfulness lends each other a mutual aid, and hence there has resulted an *ensemble* of forces which has turned to the profit of their entire manufacturing system, and which attracts towards it, by preference, the attention of the manufacturing world. It is sufficient to name the Koechlins, the Hartmanns, the Dillfus, the Schlumbergers, the Zubers—all these really patrician families—to justify this well-merited preference. It is to Alsatia that the immense development which calico printing has taken in Europe during the last twenty-five years is owing; it is Alsatia which has spread the best modes of manufacture, and which unceasingly perfects them. Nowhere better than in this land are dye-stuffs more skilfully used; nowhere are dyers' weeds, madder, cochineal, and orchilla, applied with more brilliancy or fastness. Alsatia is like a great printing school, where the masters and foremen of all nations come to form themselves. It is, thanks to her, that Europe has become partial to those graceful and light fabrics which now-a-days decorate at such small cost all dwellings, and which so economically clothe all women. The exhibition of these masters of the art was therefore expected with impatient curiosity. It has been worthy of them in every respect, and their products have become the standard by which all other analogous products are compared, to class them suitably. It is, therefore, well to state, that all the calico printers of Europe are unanimous in admitting that Mulhouse carried off the palm over all printed calicoes, as Lyons did over all silks. This superiority is easier to state than to define. The English are great producers of printed calicoes; the Belgians, the Austrians, the Prussians, the Saxons, the Spaniards, and even the Turks, are so likewise; but, with the exception of two or three Manchester houses, all these manufacturers belong rather to the school of Rouen than to that of Mulhouse. The calicoes which they print are very ordinary, and cannot compete with ours. It is through the immense quantities which they produce, as well as the economy in the details, that the English are distinguished above all other nations engaged, like them, in calico printing. Their great advantage consists in operating upon enormous masses of goods, and not to waste an atom of matter. You should see with what solicitude they seek after economising a centime on a chemical product, on a number of yarn, on a colouring matter, and on freight; and with what art they transform this economy into profit, by millions, by multiplying their markets by demand, and demand by cheapness. This art is pushed in England to the most microscopic details, and veritable oceans of wealth are created there literally drop by drop.

Thus, all their factories have a severe and somewhat gloomy aspect of grandeur and simplicity. Not a single ornament—no columns, no architectural display. High and black brick walls, iron flooring, iron stairs, iron doors, iron barriers everywhere—rarely flowers and trees around a factory—never any fruit-trees. The abodes of labour, it must be admitted, are not very cheerful in England. In France, on the contrary, and particularly in Alsatia and Normandy, the factories have nearly everywhere an attractive appearance, full of charm. They are inhabited often nearly during the whole year by their proprietors; they are surrounded with gardens, or faced by beautiful avenues, or

bordered by beautiful waters; and their more artistic character is more in unison with their destination, and with French habits. I shall never forget, as one of the noblest specimens of the kind, the beautiful factory of Messrs. Zuber at Rixheim, near Mulhouse, with its large spacious courts, shaded by magnificent sycamore trees, looking more like an Italian villa than a manufactory of paper-hangings. More not less remarkable instances might be quoted at Thann and Cemay. It is, therefore, always by means of art and taste that we distinguish ourselves, and that we compete with our rivals. They shine with the compass—we with the pencil. They derive their profit from fuel, from iron, from the mass of the products manufactured, from the greater facilities of credit amongst them; our profits are derived from our designs, from our inventions in matter of colour and form. They *force* the buyers by lowness of price—we seduce them by novelty. The prosperity of an English factory depends more on its master; that of a French factory more on its workmen.

It is evident that everywhere, where it is only necessary that machinery, almost perfect, such as those English looms of 1,200 spindles—monster machines, which move by themselves, which go, come, I might almost say, which reason—should work regularly, the capitalist and the mechanician alone suffice; but when the success of the manufactory depends upon the designers, the chemists, the finishers, the wealth of the master can do nothing; the genius of the workmen can do nearly everything. It is this value of the workmen which political economists have called their *moral capital*—infinitely greater in France than anywhere else. Thus, the magnificent sideboard executed by Fourdinois, and which has produced such a great sensation at the London Exhibition, has sprung from the brain of an able designer, M. Protat, whose name does not even appear in the catalogue. The London Exhibition, and the study of the French and English factories, point out in a very significant manner the difference in the industrial genius of the two nations. We have just described the difference in the construction, in the site, and in the objects surrounding the factories; but it is still more striking, when you enter the workshops, to study the distinctive character of the two races. The English factory operative is cold, silent, absorbed by his task; he possesses a peculiar characteristic of patient and severe firmness, which distinguishes him from other workmen even in his own country. The French workman, on the other hand, more lively, more sprightly, more open, likes to chat, and indulges in it willingly whenever the din of machinery does not drown his voice. The English workman lives more isolated, he is more fond of privacy; he prefers domestic life when he has a family. The Frenchman is more fond of living in public, of noise, and of political discussions. The English workman does not seek after the public journals with the same eagerness as the French artisan. The influences by which both races are surrounded must also be accounted for in their characters. The French, accustomed from early life to the study of arts, of design, and the sight of monuments of art; the English more accustomed to the management of machinery and its various applications. Whatever degree of superiority the severe habits of the English may impart to their manufactures, the Alsatian, more than any other branch of French industry, tends to deprive them of it, because it unites with the advantages of internal economical order, the merits of numerous arts which add value without enhancing the price of the products. It is not the richness of the material which constitutes the price of printed calicoes—it is the taste, the originality of the design, the happy combination of colours; all superiorities of French genius, which compensate, by a species of natural favour, for the elements of inferiority which we may possess.

The same contrast is found in a very different branch of industry now in process of undergoing a complete revolution, and split into two very different camps. I allude to

artistical and industrial gold and silversmith's work. Garrard in London, and M. Odiot in Paris, represented industrial; M. Rudolfi, M. Morel, M. Froment-Meurice, the artistic branch. Which of these is in the right? which in the wrong? Which of them works in the well-understood interests of production? How are we to establish an equitable comparison between such opposite styles? The gold and silversmith's craft has attained in these days such a degree of importance, that the question will not be easy to decide in the midst of the universal jury. Thus the English are still inspired by the ample forms of the age of Louis XIV., whilst in France they have long since studied to imitate the Grecian and the Roman. The English prefer the useful and the comfortable to be affected, to the bastard imitations of a revival, the originality of which too often consists in changing white into black, and to give to silver the colour of iron. We have seen too many masses of articles of this kind, at the London Exhibition; fantastical groups of doubtful utility, and better calculated to figure in a cabinet of curiosities than on a well-served table. What signify these silver palm trees, these gentlemen on horseback, these allegorical and hieroglyphical figures, and all these whimsical compositions with which English workers in precious metals have inundated the Exhibition? Nothing but a dangerous departure from the path of taste, capable of driving the entire branch of industry into a false path, and drying up the source of its markets. I prefer the manly and proud simplicity of Odiot. Odiot, the gold and silversmith, has produced gold and silversmiths' work. All his productions are destined for the use and service of the table. His candelabra, elegant as they are, are made to carry candles; his soup-tureens to contain soup, his coffee-pots to pour out coffee. You have only to place a bottle of champagne, surrounded by ice, in his wine-coolers, made of pure and simple silver—not forced, not contorted, not oxidised at considerable expense. Thus the famous Germain covered with his magnificent works the tables and the dressing-tables of Louis XIV. at Versailles. By the side of these principal pieces, where the perfection of the work vies with the richness of the material, the branch of industry of electro-silvering and gilding, of which the head-quarters at Paris are at Messrs. Christoffle and Co.'s has made its appearance at the Universal Exhibition, and has attracted a great number of visitors. It arrived late, but it has regained lost time by a skilful display, and brilliant and varied, which will ever stand in the same relation to gold and silversmiths' work, as cotton lace does to thread lace, but without damaging the former, or destroying the taste for it. Elkington's process is still in its infancy. The immense metallic movement of California and Russia is destined to give it a new impulse, and I am convinced that ere long the keys of our furniture, a considerable portion of our table cutlery, our hunting weapons, and the locks of our apartments, will be gilt by this process.

France and England have exhibited gold and silversmiths' work of an immense amount. Several makers have contributed to the value of £40,000, some for £20,000, others for £10,000. I know not who will buy these Napoleons, these Wellingtons on horseback, these towers of Babel, these infidel slayers, these tigers, these wolves and lions, of gold and silver, which are of no use. It appears to me that bronze is better adapted than the precious metals for purely artistical groups. Bronze is firmer and more severe, and it has become so flexible in the hands of Parisian workmen, that its chasing is even superior to that of gold and silver. It is in the industry of bronzes that the alliance of taste, of form, and imagination, has been most admired. This branch of industry is growing every day, and its importance will gain much from the comparison with the bronzes from the remainder of Europe, such as they have appeared at the Exhibition.

Engraved by C. Selby from a Drawing by T.H. Wilson

SILVER VASE

BY MESSRS CARRARD

Engraved by C. Selby from a Drawing by T.H. Wilson

SILVER VASE

BY MESSRS CARRARD

CHAPTER X.

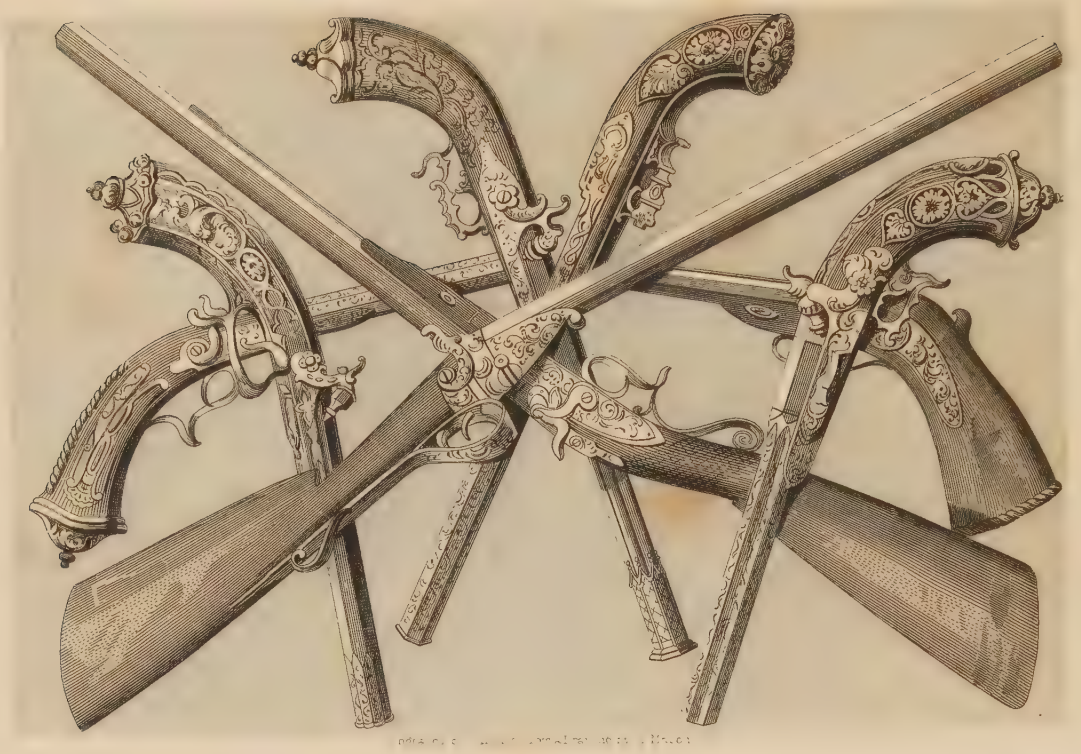
EUROPEAN WORKMEN JUDGED BY THEIR WORKS IN THE GREAT EXHIBITION—NATIONAL CHARACTER DISPLAYED—A CONGRESS OF WORKMEN SUGGESTED—THE ENGLISH WORKMAN—THE FRENCH WORKMAN—THE GERMAN WORKMAN—THE SPANISH WORKMAN—INDIAN HANDICRAFTS.

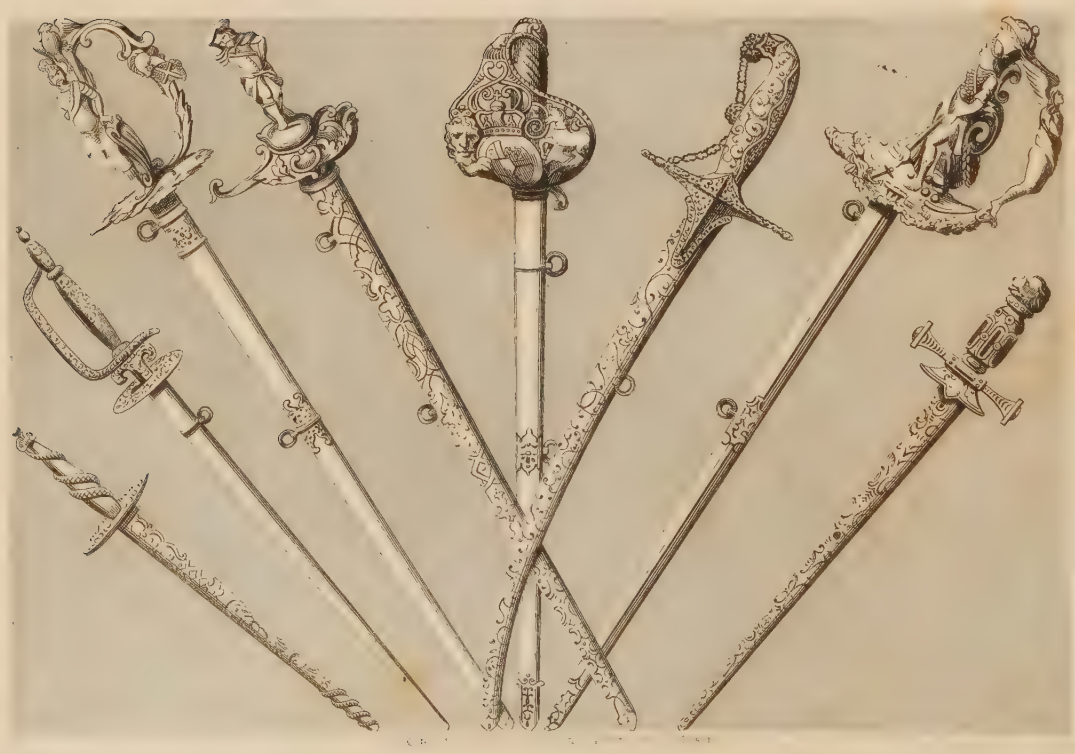
As in our preceding chapter several references are made to the WORKMEN whose various labours adorned the numerous departments of the Great Exhibition, we shall sum up the notices of our Parisian Mentor with the following article from his talented pen, on the comparative merits, peculiarities, condition, and mode of thinking and living of the different workmen of Europe. Amidst the marvels of the Universal Exhibition, says our author, the idea has frequently suggested itself to me, to cast a glance at the condition and the habits of the workpeople who, in reality, have done the honours of it, and to endeavour to seek out if some mysterious relations did not exist between them and their works. In what consist these relations? Why has each country a distinctive characteristic of national originality, to such a degree that furniture, arms, lace, and woven fabrics, but seldom resemble each other in Paris, in London, in Vienna, and in Madrid? Why are Spanish workmen so gay, so lively, and so sober, and those of England so profoundly serious, silent, and voracious? Has not French petulancy some connexion with the boldness of good taste of the French artisan, and Germanic coldness with the conscientious but heavy work of the German one? By means of what inexplicable prodigy do the workmen of India manufacture shawls more beautiful than those of Paris, and what is the unknown source of that school of designers which in the East seems every day to outstrip the limits of fancy?

I have greatly regretted that advantage has not been taken of the Exhibition to unite in a congress, in the midst of their works, workmen of all nations. They might have interchanged amongst each other, to their mutual instruction, a host of practical ideas and ingenious processes, which would have become the inheritance of the general industry of the world. In default of this cosmopolitan gathering, it will not be without interest to sketch the peculiar characteristics of the principal labouring families, whose productions have been displayed at the Exhibition, and to bestow a rapid and impartial glance upon their present condition. These large masses of men have, since the commencement of the present century, acquired an importance, and in some parts of Europe an influence so considerable, that it becomes imperatively necessary to study, in the closest manner, everything connected with their economic and social condition. The abolished system of guilds maintains still greater sway than is generally imagined amongst the emancipated branches of industry. Traditions have survived laws, and the labouring classes continue to live isolated, in a world apart, too often a sealed book to those most interested in being acquainted with it. This characteristic line of demarcation is nowhere more profoundly traced than in England. The English workman is a being apart, having his manners, his habits, his vices, his virtues, his pride, his modes of working, and his amusements peculiar to himself. His mirth and his gloom resemble no other. The miners, the spinners, the weavers, the builders, the stokers, all the workmen engaged in manufacture, have almost nothing in common with those employed in agriculture. The workmen engaged in manufacture all eventually identify themselves with the regularity of their machines, under the influence, I had almost said the despotism, of the division of labour. They are compelled to go and to come, forward and backward, like the machines *which employ them:* the machine commands and they obey. Their

task is regulated with mathematical precision, and their arms make as many movements as the break-wheels make revolutions. After some time the result is a species of automatic life, a frightful monotony, from which the workman only escapes in his leisure moments by strong and gross excitements, by intemperance, which leads to drunkenness, and this drunkenness itself is of a gloomy and savage nature, like the drinks which have produced it. The manufacturing system has likewise profoundly modified the character of the English workman. He lives less in the midst of his family, and belongs much more to his fellow-workmen than to his children. His existence has ceased to be domestic. From the commencement he is enrolled in one of the thousands of societies which abound throughout the country, and which, if need be, easily assume the attitude of coalition. The workman's forum is the meeting-place of his trade's union; it is the club of which he forms part, the economic or industrial association to which he is affiliated. These associations are reckoned in England by thousands; they form veritable tribes, which have their regulations, their prejudices, their exigencies—nay, even their superstitions. The spinners and the printers of Manchester, the hosiers of Nottingham, the cutlers of Sheffield, the smiths of Wolverhampton, the potters of Burslem, the colliers of Newcastle, the ribbon weavers of Coventry, the cloth weavers of Leeds, form as many industrial armies, obeying the voice of their chiefs, each ranged under his own banner, and in reality distinguished by a kind of peculiar physiognomy easily recognisable.

The wives and children of these workmen generally follow the vocation of their husbands and fathers. They thus get inured to them at an early age, at least in those branches of industry which admit of the employment of women and children, and they at last acquire faults, and physical and moral qualities, which are really characteristic. Their costume never varies: a spinner, a mender, a collier, a smith, are always dressed nearly in the same manner; and even their hair, particularly amongst the women, is arranged according to their vocation with invariable regularity. Their minds, incessantly bent upon the same object, eventually acquire a gift of second sight, which often, without instruction, leads them to discover improvements of important details. It is seldom, however, that their thoughts travel beyond the regions of the factory and of material enjoyments; and it is a distinctive trait in their character, that none of them dream of making their fortunes as politicians, neither does ambition penetrate their souls. They like labour for its own sake, and it is a great point of self-love with them to devote themselves to it conscientiously and perseveringly. There is a good deal of affinity between them and their machines. They have little initiative, of taste and ideas, and they are infinitely less artistical than ours. The French workman is nearly in every respect the opposite of the English one. His dependence, proud and haughty, always resembles a concession, and he deems himself attached to a temporary yoke rather than to a permanent workshop. His exactness and stability nowise partake of the English fatality and resignation; he would ever be ready to go, and to give notice rather than receive it. He is more gay, more lively, more talkative, more of a reasoner; and, since the contagion of politics has entered our manufactories, he has become imperious, cavilling, *important*, and rather occupies himself with the government of the state than that of his looms. Among many, business is looked upon as an affair of circumstance and of necessity; they occupy themselves with it because it is necessary to live, and hitherto politics have not yet discovered the secret of supplying masses of men with a livelihood without labour; but their minds are, in reality, elsewhere, and in quest of perpetual and undefinable ameliorations. The real French workman is the workman of art, and it must be said, whatever may be their faults, such are the Parisian workmen. There are excellent workmen throughout France; there are only perfect ones in Paris. Our weavers of cloth, and our spinners of cotton, resemble, in many respects the English





workmen of their categories; but the Lyonnese workman, the designer of Mulhouse, the operative manufacturer of shawls, and he who makes the ribbons of St. Etienne, have always required to receive from Paris *the secret influence*, either by means of the design, or by the idea or the *order explained*, to reach perfection. Paris is like a large school of taste, which gives the tone and the colour. It is there, in fact, that are formed, in innumerable schools of design, mostly gratuitous, these legions of ingrates, who have acquired their talent in establishments maintained by governments which, every ten or fifteen years, they take so much pleasure in upsetting.

If you examine well, you will find, in the provinces, a host of remarkable special manufactures. Doubtless, excellent guns are made at Châtellerault, and at St. Etienne; but it is in Paris alone that beautiful arms are made. Watchmaking is carried on very economically and very ingeniously in Franche-Comté, but it is in Paris that the finishing stroke is put to these watches, and it is there only (I am only speaking of France) that they are worthy of their name. Good locks are unquestionably manufactured in Picardy, and which are not dear, but the great lock-makers, the masters of the art, are all in Paris. It is thence that all inspirations emanate. The Chamber of Commerce of that city is now engaged in printing a book, which will be exceedingly curious, and which will clearly explain this economic phenomenon: it is a faithful statement of all the professions exercised in that great city, street by street, and, to some degree, man by man; an analysed register of that ingenious, intrepid, and capricious ant-hill, called the workpeople of Paris. There will appear, for the first time complete, the nomenclature of these ancient branches of industry whose products, known under the name of Parisian articles, are spread over the entire world, and which know no rivals. Nowhere is such furniture made; nowhere are toys, bronzes, paper-hangings, tapestry, articles of fashion, umbrellas, ornaments, and those thousands of trifles which represent millions in value, produced better than in Paris. This vast industrial encyclopædia comprises entire streets of the capital, the streets Saint Denis and Saint Martin, the street of the Faubourg St. Antoine, the street Grenetat, the street Bourg l'Abbé, the two streets of the Temple, where more than one unknown genius produces masterpieces at wretched prices, and frequently imparts value to nameless materials, to lucifer-matches, for instance, which absorb, it will hardly be believed, whole timber-yards. But the greater part of these branches of industry are entirely domestic; they are carried out, like the work of the milliners and lacemakers, in circumscribed workshops, in which the most skilful mechanical resources frequently secure the independence of the workman, who is paid by the piece, and who manufactures articles for which he has received or furnished the raw material according to the extent of his small capital. It is this mode of labour, common to the Parisian, and the Lyonnese workman, which imparts to both a peculiar physiognomy amongst all the races of French and foreign workmen. London does not produce the immense variety of articles that are made at Paris. Mechanism governs everything, and individual labour does not strive to seize on that part of its domain in which all the marvels of our capital are produced, under the inspiration of the taste which distinguishes its artists. Sèvres, the Gobelins, the Savonnerie, are the types of that brilliant school of decoration whose lustre has shone over the entire of French industry, to the eternal honour of those who have laid or strengthened their foundations.

The more I study the question of workmen employed in manufactures, the more I remain convinced that the true vocation of ours is to excel in those branches of industry which can do without protection, and live an independent life by inspiring themselves with the sacred fire of art. The English so thoroughly understand the French superiority in this respect, that for some time they have made unheard-of efforts to naturalize, amongst the good workmen, the study of drawing and the cultivation of the beautiful, so

necessary to the useful. Wanting their own, they borrow our workmen, thus implicitly admitting that neither the progress of machinery, nor the low price of freights, nor the abundance of capital, can compensate for the absence of taste, which is also a creator of value. Open the lists of the jury awards, and you will see how powerfully this peculiar French element of wealth has weighed in the balance, which has only charmed the judges, after having excited the admiration of the entire world. The works of the Lyonnese will probably remain the most brilliant souvenir of this memorable struggle. A third family of workmen has appeared with *éclat* on the great stage of the Universal Exhibition; these are the workmen of the German region, in which are comprised all those of Prussia, of Austria, and those of the other German states. They are less known, and have hitherto made less noise than the French and the English, because they are less agglomerated, less compact. German manufacture, with the exception of that of some towns or valleys renowned for their industrial establishments, is, as it were, lost and drowned in the wave of rural populations, which are the predominating element of that portion of Europe. But the German workmen have just proved of what they are capable, and the world has beheld with admiration a host of products created by them, worthy to compete with those of the most advanced nations. The imperial printing-office of Vienna has obtained the council medal, whilst the national printing office of Paris has only obtained the prize one. The Prussian founders have covered themselves with immortal glory. The valley of Chemnitz, in Saxony, has exhibited a host of articles capable of competing in point of cheapness and good workmanship with France and England themselves. The Austrian cabinet-makers have appeared to me likely to become more redoubtable rivals to those of the Faubourg St. Antoine than those of any other country in the world. Hitherto, however, these skilful men have only been imitators in everything. The German workman invents little, but he copies marvellously well—not servilely, but by imparting to his works a peculiar stamp of *naïveté*. They are less mechanical than the English, and less artistical than the French; but they rather incline to the French style, wanting, however, their elegance, which they sometimes happily replace by the natural and the simple, when they do not degenerate into mannerism. Their habits are, generally, tolerably temperate. The English eat; the Germans smoke intemperately, by day, by night, I had almost said at meal times, in bed—it is frightful: and if this habit should persist in developing itself, Germany will become uninhabitable. One of my greatest apprehensions is to see this ruinous taste penetrate into our workshops, where it injures and stupifies the children, and causes amongst them more serious ravages than is generally believed. The German workman lives much more in the midst of his family than the other workmen of Europe; and although the absurd spirit of communism is at this moment infecting the German world beyond all conception, the old fundamental qualities which distinguish it will struggle a long time against the tendencies of the evil genius which has been introduced, it must be admitted, into Germany, by the students of the universities. The German workman is patient and thoughtful; he has much more sensibility than the English workman, much less elegance than the French one. He likes to infuse sentiment into his works; and I might mention works in Bohemian glass, toys of Nuremberg, porcelain of Saxony, even printed calicoes, and clocks, which bear strong evidences of this tendency, which might be called pastoral, if it did not frequently degenerate into the trivial and the vulgar. On the whole, they are a race of men now very much advanced. They have gradually profited by the discoveries and processes of France and England, and after having, for a long time, made common woollen cloths in Silesia, they now manufacture very fine ones at Aix-la-Chapelle. The abolition of barriers between German states, consequent upon the establishment of the Zollverein, has contributed, in no trifling degree, to give to German

industry an impulse, which has not ceased to grow under the influence of the habits of order and economy of its manufacturing population, and by the aid of the numerous hydraulic movers, spread over the whole surface of the country. Germany will not arrest its progress in so noble a path, and, notwithstanding the efforts which have been made to allure it to the beaten track of protection, it will complete its interior enfranchisement by the speedy conquest of freedom of commerce.

The Spanish workmen do not deserve the fourth rank in the great working family of Europe; judging only from the actual importance of the products which they have sent to the Exhibition, the Belgian and the Swiss would have the right to take precedence. But Belgium and Switzerland gravitate in the orbits of France and Germany, and their workmen, nearly equally distributed between agriculture and manufactures, are not so original as those of Spain. Spanish workmen are, more than is generally imagined, choice men, remarkable for vigour as well as suppleness, and nearly all of proverbial sobriety. I have been surprised, on going through the manufactories of Catalonia, at the frugality of their habits, their liveliness, and their admirable aptitude for labour. Their intelligence and activity are well calculated to surprise those who judge of Spain from the reputation of indolence and effeminacy enjoyed by its inhabitants. The Galicians, the Basques, and the Asturians, are first-rate workmen; those of Andalusia not less so, and I have found in the province of Valencia, unjustly renowned for its idleness, work men endowed with as great an energy and ingenuity as those engaged in our silk manufactures of Lyons and Avignon. The contagion of socialism has not yet penetrated amongst these vigorous and poetic populations. They are, doubtless, much behindhand as regards education, and do not possess all the resources of machinery of the English workmen; neither are they endowed with the indefatigable and serious perseverance which characterises them, but they are eminently fitted for industrial pursuits, and the sacred light of ancient art which has shone in Spain is on the point of being rekindled amongst them. The two last expositions of Madrid, although very incomplete, have raised the most legitimate hopes in this respect. The Spanish workman is in the path of progress, since the fall of the régime which favoured idleness and recklessness in his country; as soon as the greater portion of the convents were transformed into factories, other manners began to prevail, and I am acquainted with robust monks who have become excellent spinners. Spanish industry cannot fail to revive in conditions compatible with the country, thanks to the peculiar facilities which the workman is assured of finding in the mildness of the climate, the abundance of raw materials, and, above all, the richness of its mineral products. It will be long before Spain will have to dread the invasion of the doctrines which have perverted the moral sense of the other working populations of Europe. "The workman of that country," according to the expression of M. Ramond de la Sagra, "knows not yet to curse the hand that pays him; he accepts labour as a duty, never as a yoke; he obeys from conviction and from habit, and he preserves his pride and his integrity in the humblest station." Would I could say the same of the Italians; but there is no longer an Italy. Italy no longer belongs to herself, and does not know herself; and but for the vigour of Piedmont, which her recent misfortunes have not been able to cast down, and which carries in her bosom the destinies of the Peninsula, we should have to look to the past rather than glimpse at the future, for the glory and prosperity of the Italian workman. Who will some day reveal to us the mysteries of the Indian working world!—who will cause the light to penetrate into those workshops of the East, where the hand of man is incessantly occupied for a pitiful and precarious remuneration, inferior to the wages, already so wretchedly low, of our manufacturing operative? Thus, at both extremities of the scale, the spindle and the weaving loom produce the same economical results

for the lot of the labourer. In France and in England, in Germany and in Spain, in Switzerland and in Belgium, there are entire generations who scarcely earn sufficient to live under the rule which protects them. Is not this protection an illusion? Is it not the workman who suffers from the ulterior competition, and the master who profits by the external restriction? The same cause which exhausts the one does it not enrich the other? and might it not be asked—Which is the dupe? Reply—Every body is duped: how long will it last? As a contrast, in every respect, to the energetic and laborious habits of the European workman, we shall conclude our chapter with the subjoined account of

INDIAN HANDICRAFTS.

An English engineer in India describes his experiences amongst the native workmen in an amusing article in *Chambers' Journal,* from which the following is condensed.

I had the anvils raised upon wooden blocks, so as to necessitate an erect posture while at work. The poor fellows submitted with the best grace they could, but seemed greatly embarrassed. The queer shaky way in which they stood, and the undecided flexure of the knee and hipjoints, were so indicative of a tendency to flap down on the slightest possible pretence, that it was really impossible to look at them without laughing. The work went on very slowly; but I hoped that all would soon go well: alas! I had under-estimated the tenacity of a race-established precedent; and, so, one afternoon, I found my blacksmiths perched on blocks of wood of the same height as their anvils, and hammering away with all the vigour which the stability of their tottering pedestals admitted of! It was hopeless contending with such a demonstration as this; so, to the great joy of the *lohairs* (blacksmiths), I allowed the anvils to be placed once more on terra firma. Time, which the Englishman values as money, has a very secondary place in the estimation of the Oriental. The *radj,* or bricklayer, is, I think, about the best illustration of this. He works with a trowel about the size of an ordinary tablespoon, and a small hammer weighing about six ounces. Armed with these, and squatting before his work, he, in a loud voice, summons his *rundees* (women, two of whom always wait upon each radj), and orders them to bring *eentee* and *massala* (bricks and mortar). The rundees in due season make their appearance—one with a brick in each hand, and the other with a small wooden trencher, about the size of a bread basket, filled with the massala. I am much within the mark when I say, that a single English bricklayer and hodman could in one day do the work of a dozen radjs, rundees, and all; and do it much better too. One would imagine from this that building was a very expensive process in India; but the contrary is the case. An English bricklayer and hodman will cost from eight to ten-shillings a day, while the Indian radj and his two attendant rundees will not cost more than from threepence to fourpence per day. The writer next attempts to introduce the barrow for earthwork in place of the little cowrie baskets, holding about a spadeful each. After a great deal of see-sawing, one poor fellow managed to deliver his freight. Thinking that a little practice, unembarrassed by my presence, would familiarise them with the barrow, I left them for a time, and on my return I beheld the wheel-barrow borne along by four men, very much in the style in which dead men are carried off the stage—that is, two at the head and two at the feet—palanquin style, in short. A set of lighter ones, little larger than those with which boys are accustomed to amuse themselves in England, was made, and success for a time was complete; but one day, happening to come upon them unexpectedly, there were half-a-dozen of the men walking along with the greatest possible gravity, each carrying his wheelbarrow on his head—legs in front, and wheels behind! Even after I had threatened to dismiss the first man I found carrying his wheelbarrow on his head, I met a serious-looking

old man tottering along with his barrow laid across his arms like a baby in long clothes! The first snort of the iron horse seems to have produced a complete panic, and the movement of a steam-engine was hailed like a new Avatur. I was at much pains, he says, in endeavouring to explain the principles of its action to the most intelligent of the workmen; but I found they had long ago provided themselves with what, to their thinking, was a complete theory of the whole matter. The doctrine was, that the boiler contained an English *bhoot* (spirit); that we made a fire beneath the boiler, and roasted the said bhoot until he called out *duhagei* (mercy) through the safety-valve; and then only, and not before, would he go to work: the water was merely given to quench his thirst! The time is not far distant when the rich produce of Central India will be poured into Europe with a profusion and regularity never yet dreamed of. The steam-engine is destined to do more for India than all her other teachers have yet effected. This iron apostle of civilization does not declaim; it does not dispute nor vituperate; but it works, and always succeeds.

CHAPTER XI.

MANUFACTURES FROM CAOUTCHOUC.

(From the Jury Reports.)

ACCOUNT OF PRODUCTION OF CAOUTCHOUC—HOW PREPARED AND PURIFIED—FIRM OF MACKINTOSH AND CO.—MR. GOODYEAR—VULCANIZATION OF INDIA RUBBER—ITS CONTINUALLY INCREASING USEFULNESS — MANUFACTURES FROM GUTTA PERCHA—MODE OF OBTAINING GUTTA PERCHA—REMARKS ON ITS VARIOUS USES.

THE existence of a milky juice in many plants, which flows from them when their tissues are wounded, is a fact that has been familiarly known from time immemorial. It is, however, only a matter of recent discovery that this milky juice characterises several families of plants. Although the great majority of plants which yield this juice in abundance are tropical, yet they are not without their European representatives. The spurges, dandelion, and celandine of our road-sides, are instances. The families of plants which furnish this milky juice in the greatest abundance are Moraceæ, Euphorbiaceæ, Artocarpeæ, Apocynaceæ, Cichoraceæ, Papaveraceæ, Campanulaceæ, and Lobeliaceæ. This juice, which is called by botanists "the milky juice," because it has an appearance similar to milk, has also the physical constitution of that fluid. It is an aqueous liquid, charged with soluble matter, in which float globules of a substance insoluble in water, and which are by their tenuity held in suspension in the liquid, but for which they have no affinity, in the same manner as butter is held in suspension by milk. From the difference of the refractive powers of these two substances, each of which, taken separately, would be colourless or transparent, arise the opacity and white colour of the two; hence the compound is properly called a "milky juice." The analogies which this juice exhibits with the milk of animals and vegetable emulsions are seen in the manner in which it acts when left to itself. Run out into the air, received and preserved in close vessels, it separates itself into two layers, as milk itself would do. The watery part very soon has an insoluble part floating upon it, which collects together, and swims at the top as cream swims upon milk, and which forms nearly half of the entire mass. But with these physical resemblances the analogies cease. That which in milk and in

emulsions produced from seeds collects on the surface of the aqueous liquor, is, properly speaking, a fatty body containing oxygen in its composition, as they all do; while the kind of cream which swims upon the milky juice of the plants when left to itself, is one of the compounds of carbon and hydrogen which are found so frequently in organic bodies. The latter, when obtained for commercial purposes, bears the Indian name of *caoutchouc*.

This substance has long been known to the natives of both the Old and New World, in Hindostan and South America. It was not, however, till the expedition of the French Academicians to South America in 1735, that its properties and nature were made known in Europe by a memoir upon it by M. de la Condamine. This notice excited little attention; and subsequently notices of this substance were sent to the French Academy, in 1751, by M. Fresnau, and in 1768 by M. Macquer. At the latter end of the last century and the begining of the present it was brought into this country in small quantities, where, on account of its being used for rubbing out black-lead pencil marks, it acquired the name of India-rubber. Although, after its application to the waterproofing of garments, its consumption gradually increased, the importation into the United Kingdom in 1830 appears not to have been more than 50,000 pounds. In 1842, the import of this article had increased to between 700,000 and 800,000 pounds. Up to the present time the consumption of India-rubber has prodigiously increased; and one part alone in South America is said now to send to Great Britain nearly 4,000 cwts. annually. To the large consumption in the United Kingdom we must add that of America, where the application of caoutchouc has been much more general and successful than even in our own country.

The particular species of plants which are employed for procuring India-rubber are very numerous, and it is probable that many yield it which are not yet known to botanists. The tree which supplies most in continental India is the *Ficus elastica*, a tree belonging to the order Moraceæ; it is exceedingly abundant in Assam. All the species of ficus yield caoutchouc to a greater or less extent in their juices, and even the common fig (*Ficus carica*) of Europe contains it. Species of ficus produce the caoutchouc brought from Java, and *F. radula*, *F. elliptica*, and *F. prinoides* are amongst those mentioned as affording a portion of that brought from America. Next to the Moraceæ the order Euphorbiaceæ yields the largest quantity of caoutchouc. The *Siphonia elastica*, a plant found in Guiana, Brazil, and extending over a large district of Central America, yields the best kinds of India-rubber that are brought into the markets of Europe and America. To another order, Apocynaceæ, we are indebted for the caoutchouc which is brought from the islands of the Indian Archipelago. The plant which is the source of this substance in those districts is the *Urceola elastica*, a climbing plant of very rapid growth and gigantic dimensions. A single tree is said to yield, by tapping, from fifty to sixty pounds annually. Many other plants of this order yield caoutchouc, and of those given on good authority we may mention *Collophora utilis* and *Cameraria latifolia*, plants of South America; *Vahea gummifera*, in Madagascar; and *Willughbeia edulis* in the East Indies. To this order belongs the cow tree, or Hya-hya (*Tabernæmonta utilis*), of tropical America, which yields a milky juice that is drunk by the natives of the district in which it grows. The caoutchouc, whilst it is in the tissues of the plant, is evidently in a fluid condition, but after its separation from the other fluid parts, its consistence becomes changed, and it forms a solid mass similar, in its external characters, to vegetable albumen. In this state it is dense and hard, but may be separated and rolled out so as to form a sheet resembling leather. It has many interesting and peculiar properties. Insoluble in water and in alcohol, it dissolves in ether, in the sulphuret of carbon, the fat oils, and the liquid carburets of hydrogen. It is soft and elastic at the ordinary temperature, but at the temperature of two degrees above the freezing point, it acquires

the hardness of wood. A temperature of 100 degrees softens it without altering its form. It then unites with itself with the greatest facility, and two pieces recently cut apart reunite so as to render it impossible to discover where the junction has taken place. But a higher temperature, approaching 150 degrees, changes it into an adhesive substance, which, on cooling, does not recover the primitive properties of caoutchouc. In this state of recent coagulation, and while still in a pulpy condition, caoutchouc possesses a degree of plasticity which admits of its receiving, by means of moulds, the most varied forms.

The greater part of the caoutchouc of commerce is obtained by the natives of the countries in which it is produced, in the form of shapeless masses, collected at the foot of the tree which has been incised or cut, for the purpose of extracting the juice from it, or solidified in a trench made in the earth, and coagulated in this rude mould in voluminous masses, which often resemble the trunk of a large tree. A part of it, however, possesses other forms, which the rude art of the natives attempts to communicate to it. They model, with plastic clay, figures of animals, imitations of the human foot, and pear-shaped bodies, and then dipping these moulds in the thickened caoutchouc, and renewing the connexion when the first coat is solidified by exposure to the air, they obtain, by breaking the mould and getting it out in fragments through an opening properly arranged, hollow flasks, figures of animals, rough slippers, &c. They thus make caoutchouc serve for the manufacture of objects for which we ourselves employ animal membranes and leather. Caoutchouc is obtained from both the Old and New World. The East Indies furnish caoutchouc, of which numerous specimens have been exhibited in the Crystal Palace by the East India Company. This caoutchouc, which comes principally from Java, is often glutinous, and is less esteemed in commerce than that furnished by the equatorial regions of America. Great quantities of caoutchouc are imported into Europe from Mexico, from South America, and especially from the province of Para, in Brazil. That which comes in the shape of bottles is generally preferred, and when it is pure, and the different coats which comprise it are well united, it may be employed immediately for many purposes. But it often happens that the coats which form the pear-shaped masses are badly united. It then becomes necessary, in order to make use of them, to work it up by a process of kneading, so as to obtain it in a coherent or homogeneous mass. This operation becomes especially indispensable when, as most commonly happens, the caoutchouc is in large impure masses, and mixed with sand and the debris of vegetable matter. These impurities do not entirely proceed from the moulds made in the earth, into which the juice has been allowed to exude, and in which it has been left to thicken and solidify, for their quantity and their presence between the coats of the pyriform masses show that the impurity is mainly to be attributed to fraud. The caoutchouc thus obtained is not applicable to any use until it has undergone a previous purification. The purification of the caoutchouc is accomplished by submitting the impure caoutchouc to the action of cylinders furnished with teeth turning in opposite directions and with unequal velocities, which cause it to undergo a kind of mastication. If the matter which renders the caoutchouc impure adheres very closely when dry, this property is lost when it is moistened. From this it happens that, by causing a small jet of water to flow into the apparatus, these foreign matters, crushed by the mill, are carried off by degrees, and the purified portions of caoutchouc unite the one with the other. By the subsequent exposure of these masses of purified caoutchouc to a second mastication, but performed dry, they are softened by the heat evolved during the forcible compression to which they are then submitted. In this treatment the caoutchouc becomes softened without being liquefied, and a homogeneous mass is formed which is cut in the form of rectangular blocks. These are again placed in casting moulds, in which they are powerfully compressed, until they are completely

cooled, when it is found that the pressure has freed them from cavities, air-bubbles, &c. By submitting them to the action of knives moved very rapidly by a mechanical action, and the edges of which are constantly kept wet by a thin jet of water, the caoutchouc is cut into sheets of various thicknesses, which, subdivided in their turn, constitute those small parallelopipedons used by draughtsmen to rub out the marks of black-lead pencils.

This use of caoutchouc was, in England, for a long time the only one to which it was applied; but this limited use was far from indicating the extent to which caoutchouc has been employed in the last thirty years, or the multiplicity of services it has been called upon to perform for sanitary and industrial purposes. To rub out pencil marks, to form the rude slippers which seemed well adapted to the Indian toilet, but to which a form acceptable in Europe had not been imparted, were, in fact, the only uses to which caoutchouc was applied up to 1820. In England was discovered the art of stretching it into thin sheets, and thus making it available for the production of waterproof fabrics. In France was discovered the art of drawing it out into delicate threads for the manufacture of elastic tissues. We are indebted to Messrs. Mackintosh and Hancock for the application of caoutchouc to the rendering tissues waterproof, and for the manufacture of those garments which throughout the world have rendered unquestioned service to the cause of health, and made the name of one of their inventors so justly popular. The garments called Mackintoshes are well known. They are formed of fabrics covered on one side with caoutchouc, or two fabrics are united by the caoutchouc between. They are thus rendered impermeable to water, but at the same time they possess a flexibility such as it had never been possible to obtain by the employment of other varnishes. For the purpose of obtaining the sheet of caoutchouc sufficiently thin for this purpose, it is dissolved. The solid carburets of hydrogen are soluble in the liquid carburets, and for this purpose spirits of turpentine and the volatile products of coal tar were first employed. But after having obtained this solution, it was necessary to evaporate a great quantity of it for the purpose of obtaining a coating of caoutchouc, which at first occupying a great space, should be reduced to a small one when the drying was complete. For the purpose, however, of economising the solvent, a method is employed of kneading the caoutchouc, by means of powerful machines, with the spirit of turpentine or naphtha, and impregnating it with the menstrua without dissolving it, and softening it without making it a liquid; the caoutchouc rendered pulpy, is then spread upon the cloths by means of a flattening mill, and the process of evaporation is thus dispensed with. Waterproof garments were thus rendered cheap and available for the use of every class. This description of garment, nevertheless, presented a notable fault which was not avoided until a later period, and which arose out of the properties inherent in the caoutchouc itself. This substance, which in ordinary circumstances, possesses very great elasticity, such as to justify the name by which it is designated in France, *gomme élastique* (elastic gum), loses this elasticity when exposed to a temperature near the freezing point of water, and this suppleness, which might almost cause a sheet of caoutchouc to be mistaken for an animal membrane, gives place all at once to the rigidity exhibited by the same membrane when dried. This property, which in cold weather was a real defect, when applied to fabrics rendered waterproof by caoutchouc, has been found very useful in the making of garters, braces, and other articles in which the elasticity of the caoutchouc has been brought to supersede that which had, until then, been obtained by the employment of spiral metallic springs. In order to obtain the threads which are used for the manufacture of elastic tissues, either the flasks of caoutchouc in its natural state, cut in half and flattened by pressure, or else those masses of purified caoutchouc which are sold in continuous sheets, cut by knives, wetted by small jets of water, are employed. These sheets are divided into thongs; the latter are afterwards subdivided into very narrow

bands, which serve in their turn to produce the threads employed for the manufacture of the tissues. If by a slight elevation of temperature the natural elasticity of the caoutchouc is increased, these narrow bands can then be stretched into threads of great length by drawing them out and rolling them upon bobbins. But it may be well conceived that the management and weaving of the threads would be very difficult if they retained their elasticity. Fortunately the particles of the caoutchouc eventually accommodate themselves to the forced position which they have been made to assume, and the exposure to a low temperature materially hastens this result. The threads having thus lost their elasticity can then be introduced like common threads into the fabrication of stuffs; they can be covered with a different thread, by winding spirally round them cotton, silk, &c., and this compound thread may be in its turn introduced into the composition of new tissues. In all these operations the caoutchouc has retained all its rigidity, but that elasticity of which it has been deprived by a long distension and a low temperature, can be restored to it by means of a proper degree of heat. The stuff thus woven is exposed to a temperature of from 140 degrees to 160 degrees Fahrenheit, by the passage of a hot iron, when each thread resumes with its primitive length the diameter which it first possessed. The fabric diminishes in length without increasing in width. The tissue is thus compressed, and the caoutchouc, which has regained its elasticity, communicates it in a permanent manner to these tissues. The manufacture of these threads of caoutchouc constitutes at present a distinct branch of industry from that which, making use of them either in an uncovered state, or covered with silk and cotton, combines them with ordinary threads in the way of weaving; and, like the manufacturers of linen or cotton fabrics, the makers of the elastic tissues buy the threads of caoutchouc in bobbins of different numbers. When the limited lengths of the narrow bands from which these threads are manufactured is borne in mind, the necessity is foreseen of being able to unite them end to end for the purpose of making continuous threads. A remarkable property of caoutchouc renders this easy. It unites with itself with the greatest readiness if it be the least warm; and two surfaces recently cut with a very sharp instrument, may be made to adhere together by means of pressure, with a cohesion equal to that which unites the other parts of the same thread. But although in this case this property is made useful, in other instances the limited elasticity, and the rigidity communicated to it by a low temperature, are great drawbacks. However, all these properties inimical to its use disappear in that combination of sulphur with caoutchouc called vulcanized India-rubber, which exhibits such special properties as to form in some degree a new substance. This transformation of caoutchouc was first applied to practical purposes in America.

While in England the employment of caoutchouc was being developed principally in regard to the rendering of cloths waterproof, and in France its elasticity was being made available for the manufacture of certain tissues, it was turned to account in America for waterproof shoes, by making use of the processes discovered by Mr. Charles Goodyear, who, since 1836, had been engaged in the discovery of means for making use of caoutchouc, with a skill and perseverance which have borne the most happy fruits. It is not that attempts at fashioning according to the European taste, and thus rendering useful the Indian shoe made of caoutchouc, had not been frequently made in Europe, but these attempts had hardly been successful in giving them acceptable forms, and the stiffening by cold rendered them very inconvenient. However, Mr. Goodyear at last succeeded in making shoes of raw India-rubber purified, and perfectly free from objection, thus completing by the manufacture of waterproof shoes the service which Mackintosh had begun by the invention of the garments which bear his name. Since 1842, Mr. Goodyear has imported into Europe shoes which possess an unlimited and permanent

elasticity, and which resist cold; two of their surfaces may be pressed against each other without the least adhesion taking place. These are precisely the remarkable qualities which characterise that caoutchouc which is called in the present day vulcanised India-rubber. Impressed, perhaps, with the idea, too often moreover a just one, that the specification of a patent is sometimes nothing more than the occasion of attracting the attention of imitators, Mr. Goodyear took no patent for this article, but he endeavoured in Europe to take advantage of his discovery, by communicating it as a process of which he alone possessed the secret, which might be lost to mankind, and disappear with its sole possessor, when Mr. Thomas Hancock, of Stoke Newington, who had been engaged in Europe in the working of caoutchouc with no less perseverance and success than Mr. Goodyear in America, discovered anew the process of the vulcanisation of India-rubber, and secured it by a patent, which Mr. Goodyear afterwards demanded for the same subject. Mr. Thomas Hancock discovered that a band of caoutchouc dipped into melted sulphur, and impregnated with this substance, without losing any of its properties, only required to be afterwards exposed to a temperature of about 300 degrees Fahrenheit, to acquire properties entirely novel, which were precisely those possessed by the material employed by Mr. Goodyear for the waterproof shoes.

This was, as may be seen, a new discovery of a fact already known—a novel solution of a problem which was known to be soluble, since it had been already solved. This discovery must, however, have presented its difficulties, and required also the fortuitous co-operation of favourable circumstances. For though analysis might have pointed out to Mr. Hancock the existence of sulphur in the productions of Mr. Goodyear, and have also disclosed the presence of the salts of lead which the latter had deemed indispensable, it could not in any manner give him a clue to the discovery of the essential condition of this transformation, that is to say, the employment of a given temperature, which alone was able to impart to the mixture of caoutchouc and sulphur the new properties which appeared to make of it an entirely new body. Whatever may be the share of merit assigned to Mr. Goodyear and to Mr. Hancock in this important invention, the latter has not the less exclusive merit of having discovered that sulphur was the sole cause of the vulcanization of India-rubber. On seeing Mr. Charles Goodyear introducing the different salts of lead into the specification of the patent which he subsequently took out, it is felt that he regarded their intervention as indispensable, while it is now demonstrated that sulphur alone is sufficient; if other substances are employed in certain cases, it is not so much to aid in the vulcanization of the caoutchouc as to add to its weight and solidity. The vulcanization of India-rubber is an easy process. The India-rubber, softened by the heat evolved when it is being kneaded by strong machines, is mixed with the sulphur in the masticating apparatus already alluded to. This mixture retains all the solubility of the caoutchouc in the different menstrua—the property of becoming hard at a low temperature as well as that of uniting with itself; but as soon as it is exposed to a temperature of 300 degrees Fahrenheit—a temperature which would have sufficed to change the pure caoutchouc—the matter acquires new properties. It is no longer soluble in the menstrua which dissolve caoutchouc, but is impregnated with them by contact, and swells out like an animal membrane that is moistened with water; resuming its primitive properties on being dried. It no longer becomes rigid when exposed to cold, nor does it unite with itself, and it resists without any alteration a temperature which would have sufficed to transform the ordinary caoutchouc into a sticky matter; it is, in short, vulcanized India-rubber. This absence of the tendency to adhesion is so decided, that in actual manufacture no use whatever can be made of the shavings of the caoutchouc thus modified, and the means of separating the sulphur and reproducing the pure caoutchouc presents at the present day an important problem to solve.

If this action of heat which modifies the caoutchouc is exercised upon a mixture enclosed and compressed in a mould, the material then acquires a form which the indefinite and permanent elasticity of the vulcanized India-rubber causes it to retain. This sulphurization of the India-rubber, instead of being produced with free sulphur, may be obtained with sulphur in a state of combination, as with the chloride of sulphur. If articles of common caoutchouc are immersed for one or two minutes in chloride of sulphur, diluted in fifty or sixty times its weight of sulphuret of carbon, they acquire, by exposure to a proper temperature, all the properties of vulcanized India-rubber. In commerce this caoutchouc is designated by the name of converted caoutchouc. From the moment in which the vulcanization of India-rubber was known, all the inconveniences which ordinary caoutchouc presented having disappeared, its employmemt received an extension which is continually increasing, and each year sees new applications of this product spring into use. The enumeration of the objects exhibited by the two manufacturers to whom this branch of manufacture is the most indebted, Mr. Goodyear, in America, and the firm of Mackintosh, in Europe, will tend to show how widely spread, and how varied the use of this material has already become.

MANUFACTURE FROM GUTTA PERCHA.

The substance designated by the name of gutta percha, is, like caoutchouc, a carburet of hydrogen, and isomeric with that substance, and possesses a great number of the properties which characterize India-rubber, but exhibits certain special properties which admit of its being applied to particular uses to which caoutchouc is not adapted. Gutta percha possesses as great an indestructibility by means of chemical agents as caoutchouc. It has an intermediate consistence between that of leather and wood; it is capable of being softened by heat, and of regaining its primitive consistence on cooling. It is, therefore, at the same time, capable of taking, and of retaining the most delicate impressions. The important uses to which it has been latterly applied, are only the forerunners of those to which it will be adapted hereafter, provided the lack of this precious material (which unfortunately is produced in much less quantities than India-rubber, and in localities much more circumscribed) does not present an obstacle to it. Whilst the plants which furnish caoutchouc abound in the whole of the territorial zone which extends between the tropics, the *Isonandra gutta*, belonging to the natural order Sapotacea, is the only tree which yields gutta percha. It grows scarcely anywhere, except in certain parts of the Malayan Archipelago, and, up to the present time, has been almost exclusively obtained from Singapore. It was brought for the first time into England in the days of Tradescant, as a curious product, under the the name of *Mazer-wood,* and subsequently it was frequently brought from China and other parts of the East, under the name of India-rubber, in the form of elastic whips, sticks, &c. In 1843, Doctors D'Almeida and W. Montgomery drew particular attention to it, together with its various singular properties, its easy manipulation, and the uses for which the Malays employed it. The most common employment of it was for whips; and it was by the introduction of a horse-whip made of this substance, that its existence was for the first time known in Europe. The exhibition of the products of the East Indies, shown by the Honourable East India Company, proves that the natives of the country in which the *Isonandra gutta* grows, knew also how to appropriate it to the manufacture of different kinds of vases, and that European industry has little more to do than to imitate their process.

The importation of gutta percha into England, where the employment of this substance first drew attention, was in 1845 only 20,600 lbs.; but in 1848 it had increased to above 3,000,000 lbs.; and during the last three years, the importation has amounted

to a much larger quantity, and one which begins to cause some apprehension as to the possibility of the supply sufficing for the requirements of the novel uses in store for it in the future. It is true, that during its use, gutta percha is but little consumed, and the waste from the articles in this material, submitted to a proper softening, can be made to serve new uses; nevertheless, its constantly increasing consumption, added to the barbarous manner in which the product has hitherto been extracted, may justify some apprehension. During the first few years of the employment of gutta percha, it was the custom to cut down the tree for the purpose of obtaining the juice, which, left to itself, very soon allowed the gutta percha to separate and coagulate of its own accord. There is reason to hope that European industry will soon be embarked in the cultivation of this product, and that the *Niato* (which is the name that the Malays give to the tree which produces gutta percha), multiplied by means of a regular culture, naturalised in other countries than those to which it is indigenous, and worked by regular incisions, which will only take from the tree a portion of its juice without hindering its development, will be the means of furnishing, at a low price, a substance which is destined to render notable services to industrial and domestic economy. The gutta percha, which arrives in Europe in the form of lumps of some pounds weight, is far from being pure. The natives of the Malayan Archipelago make no scruple of introducing into it stones, earth, &c.; the presence of which in the interior of these blocks renders a purification indispensable, which purification, however, is capable of being attained without much manipulation. Ever since its first introduction into Europe, gutta percha has, in fact, found everything provided for the purpose of cleansing it, and has been found capable of being worked by the processes and instruments which are employed in the purification of India-rubber. At the present day the block of gutta percha, cut into slices by a strong machine, is softened by means of hot water, divided and torn into shreds by the same machine that is used for India-rubber, which serves to knead the gutta percha in such a manner, that the crushed stones and earth may be separated from it on being diluted in the water; it is then dried, and submitted, by means of a powerful machine, to a mastication similar to that which India-rubber is made to undergo; and when, after some hours of kneading, the mass has become homogeneous and sufficiently softened, it is drawn by the drawing-mill into cylindrical cords, into tubes of various diameters, or it is spread out by means of the flattening machine (as is done with lead) into sheets of various thicknesses, which are finally divided into bands, from which are cut out, with a ripping tool, the pieces which are required to be employed in different uses.

Whatever difficulty manufacturers may have had in procuring gutta percha fit to be made use of, they have at least been able to concentrate their efforts upon the discovery of uses to which it is adapted; and in the space of a few years have discovered numerous and important ones, as may be witnessed in the beautiful exhibition made by the Gutta Percha Company. One of the first and principal uses of gutta percha was to supersede the leather bands employed in machinery for the transmission of movements. This is very nearly the only use to which it has hitherto been employed in France. It seems, moreover, that latterly in England some inconveniences have been found to result from this employment of gutta percha; but should its use for that purpose diminish, every day others are found for it. Indestructible by water, and at the same time a bad conductor of electricity, gutta percha has been found available for enclosing the metallic wires employed in the electric telegraph; and the use of this substance may certainly claim its share in the success of the submarine telegraph, which has just brought London and Paris within a few minutes of each other. It may be conceived to what a variety of forms a substance can be turned, which becoming soft without adhering at the temperature of boiling water, regains at the ordinary temperature the slight elasticity and

the consistence of leather. Thus agriculturists and manufacturers have turned it to account for the fabrication of buckets of all kinds, light, indestructible, and capable of being mended by a slight degree of heat and pressure when they are worn out. It is especially in the manufacture of articles for maritime use that gutta percha, resisting as it does the action of water, and especially of salt water, appears to be the best adapted. Buoys of every description for anchors, nets, &c., have been made of it; sailors' hats, speaking trumpets, &c. There is no doubt that it will be brought to perform a useful part in waterproof garments, as well as in the construction of life-boat apparatus. If India-rubber has been advantageously combined with leather, it may be conceived that the combination of gutta percha with wood, of which Mr. Foster has shewn a specimen at the Exhibition, may in certain cases offer peculiar advantages. The decorative art has also taken advantage of the plastic properties of gutta percha. All those different articles of furniture, the prices of which are so much enhanced by carving, are capable of being reproduced by means of pressure, and thus multiplied at a low price. Writing-tables, work-baskets, &c., can be produced in gutta percha, and thus be made to combine the threefold advantage of lowness of price, elegance of form, and absence of fragility.

In the large manufactory which is more especially devoted to the employment of gutta percha, are made every day a great quantity of mouldings, friezes, panels, leaves, &c., and of articles of every description. These, combined by the decorator, covered with gilding (which gutta percha takes in perfection), are, in the manufacture of picture frames, and in the decoration of furniture, capable of superseding the carving upon wood, which is so costly, or papier-maché, and carton-pierre, which presents the defect of great fragility. On going through the exhibition of Messrs. Thom & Co., as well as that of the Gutta Percha Company, we may judge of the extent which the employment of this substance promises to the decorative art by the imitation of carving upon oak, rose-wood, &c. Bronze articles have also been reproduced in a felicitous manner; and the clearness of the edges and the purity of the forms make it easy to understand how gutta percha has been found capable of being used for making galvano-plastic moulds, and how some experiments have begun to be tried for the purpose of substituting this material in the process of stereotyping, for the metal with which at the present day the pages of our illustrated books are multiplied. This employment of gutta percha for the reproduction, by pressure, of objects for interior decoration cannot but be widely extended, enabling the many to enjoy those graceful and elegant forms which, as long as they could not be reproduced in a material indestructible by water and free from fragility, could only be brought within the reach of the few.

Quite recently, by the exertions of Mr. Truman, a lump of coloured gutta percha, moulded into the form of a jaw-bone, has been found capable of holding together artificial teeth, and thus advantageously superseding those settings in gold, which were so costly, and the absolute rigidity of which, moreover, presented much inconvenience. The slight but sensible elasticity possessed by gutta percha renders it, on the contrary, very well adapted to this use. There is another use to which the exertions of H. Mapple have rendered gutta percha applicable. Soles of this substance, glued on to the upper leathers by means of gutta percha dissolved in gas-tar, constitute shoes which are not affected by water, which last a long time, are very simple and economical in their make, the soles of which are easily mended, and easily put on again when they come off, and can be made to serve anew by means of a fresh kneading up when they have become unfit for use; thus constituting a description of shoes, the use of which cannot fail to become extended in such a general manner as to render notable service to health. Gutta percha soles have also been found capable of being affixed with much advantage upon leather soles. This solution of gutta percha in the oil of tar, like that of caoutchouc,

which, by its evaporation, leaves the caoutchouc uninjured, can be made use of to obtain sheets of gutta percha of extreme thinness, which have already been begun to be used in surgery, as well as in the preparation of waterproof papers and cloths. It is more especially to the manufacture of chemical utensils for the preservation and conveyance of acids, that gutta percha seems destined to render the greatest services. Latterly pumps for hydrochloric acid have been made of it, pipes for conveying this acid, bottles in which to send it away; large wooden vessels have been lined with gutta percha, in which to preserve the acid; gasometers are being constructed, which will be capable of collecting the sulphuric acid disengaged in certain chemical actions, and which would have corroded metallic vessels.

A council medal was awarded to the Gutta Percha Company for their various novel applications of this substance, and for the extensive specimens they exhibited. A prize medal was also awarded to the West Ham Gutta Percha Company, for the rich variety of objects they exhibited, amongst which, one of the most conspicuous was a group representing a boar hunt, covered with a metallic coating in imitation of bronze, which displayed the success with which gutta percha may be employed in the decorative and even fine arts. The exhibitor succeeded in combining gutta percha with sulphur and the metallic sulphurets, to which the name "metallo-thianised" gutta percha has been applied. The gutta percha thus treated is as hard as ebony, and can be used for most purposes to which wood and ivory are generally applied.

CHAPTER XII.

SUBSTANCES USED AS FOOD.

AMERICA, ITS RAW PRODUCE—SCOTLAND, MESSRS. LAWSON AND SON—AGRICULTURAL SEEDS, GIBBS AND CO.—MALT AND HOPS—BEER—CHAMPAGNE—TOBACCO—ASSAM TEA—COFFEE—CHICORY—COCOA—PARAGUAY TEA—PRESERVED MEATS—PRESERVED VEGETABLES—CANADIAN PRODUCTS—NEW BRUNSWICK—NOVA SCOTIA—AUSTRALIA—NEW ZEALAND—CAPE—FRENCH PRESERVED MEATS—AUSTRIAN CONTRIBUTIONS—SPAIN—SWITZERLAND—UNITED STATES—MEAT BISCUIT—OSMANZONE—PRESERVED MILKS—CAVIARE, ZUPANG, ETC.—BIRD'S NESTS—PREPARATIONS OF BLOOD—HONEY—ISINGLASS.

In inviting the attention of our readers to the consideration of Food, we confess we are no disciples of

> "———— Those budge doctors of the Stoic fur,
> Who fetch their precepts from the Cynic tub,
> Praising the lean and shallow abstinence."

We urge that moderation in the use of the good things of this life is a far superior virtue than that of total abstinence; and we hold to the sentiment expressed by Milton, which we take to be his own, albeit he has put it into the lips of Comus—rather a questionable authority, our adversaries may suggest. Let us see, however, what the jolly reveller advances, for truth is valuable, from whatever source it may proceed—

> "———— If all the world
> Should in a pet of temperance feed on pulse,
> Drink the clear stream, and nothing wear but frieze,
> Th' All-giver would be unthanked, would be unpraised,
> And we should serve him as a grudging master,
> As a penurious niggard of his wealth,
> And live like nature's bastards, not her sons."—*Comus.*

Let us, then, now open our eyes and admire the vast fertility of nature, and contemplate with thankfulness the various means of food and subsistence that the bounteous hand of Providence has provided for the benefit of mankind. An American gentleman, walking through the Exhibition, was somewhat cheered, when looking round on the empty spaces and half-filled cases devoted to the United States, by the remark of an Englishman, that at any rate America had the advantage in her specimens of corn and maize and salt meat, which might be said to be the raw material of the whole Exhibition. This is a true statement of the fact, and it indicates the most important relation of America to Europe. The inhabitants of the Old World do not seek the shores of the New to indulge their taste in the fine arts, or provide themselves with luxuries to deck their tables and adorn their palaces. It is the demand for food—lying at the root of all more transcendental tastes—which drives the European to America. How fitly, then, were the United States represented by ploughs, harrows, drills, waggons, sacks of corn, ears of maize, and barrels of salt meat—by indications of the space and specimens of the fruits which they had to offer to an over-crowded continent! It was one of the drawbacks to the testing here the substances used as food, that the visitor was not allowed to try them by the sense to which they especially appeal. We can, therefore, report only from sight; and, so far as that enabled us, with regard to the United States' exhibition of these articles, we may say that the samples of wheat, maize, and other grain, indicated at once the fertility of the soil and the good management of the farms on which they were grown. It is not our intention to speak generally of the substances used as food which were to be found throughout the various divisions of the great Exhibition, but more particularly of Class III., according to the catalogue. First, let us take those from the vegetable kingdom. In this department were found a very extensive series of cases and fittings devoted to a display of the vegetable substances used in food, medicine, and the arts from Scotland. This Scotch exhibition was almost an epitome of the raw produce of the vegetable kingdom throughout the British islands, as there are few things of any use that will grow in any other part of this country that will not grow in Scotland. These specimens, which had been got together by the Messrs. Lawson and Son, of Edinburgh, were regarded with interest on account rather of their completeness than of their rarity. Here we had the various cereal grasses of Europe, as wheat, barley, oats, rye, &c., and the varieties which are commonly grown in Scotland, or which are produced in that country as used in other parts of the world. Not only were there exhibited the grains or fruits of those plants which are employed, and the various substances which are manufactured from them, but we had dried specimens of the plant in blossom, and during the time of the ripening of its fruit. The various kinds of farm and garden produce used for food were also represented here. In cases where the vegetable substance could not be kept or dried, wax casts were substituted. Thus, we had a series of specimens of roots, as carrots, turnips, &c. Casts also of rare specimens of curious forms, and of the varieties cultivated were exhibited. The grasses grown and used as fodder for animals were shown on the same scale. On either side of the entrance to this Scotch compartment in the south gallery were found two living specimens of an interesting grass, the Tussack grass (*Dactylus cæspitosa*), a native of the Falkland Islands, which have been grown in the Western Hebrides, and have produced flowers and seeds, so that it may be hoped this valuable grass may be shortly naturalized amongst us.

Most of our native British plants which are used in medicine were also to be found in this collection. In the glass cases looking north were a series of blocks of wood in their rough and in their polished condition, with also dried specimens of the branches, leaves, and flowers of the plants that have yielded them. Those who were anxious to gain a general view of the products of the vegetable kingdom in Great Britain, might have

referred with unhesitating satisfaction to this collection of Scotch vegetable products. Of the agricultural produce, generally, exhibited in this department, we may say that there were very fine specimens of wheat and barley, also of malt. The Messrs. Gibbs and Co. had a large space devoted to them for the display of various agricultural seeds. We did not observe anything new in this collection; but it was found of interest to the practical agriculturist, as affording a view of the seeds employed in British agriculture at the present day. We were sorry, however, to be obliged to find fault with the unsightly appearance of the table on which these seeds were spread, and with the enormous loss of space attendant on their arrangement, which, far from assisting in their examination, almost entirely prevented it. From barley and malt we naturally turn to hops; and here we found several specimens from various parts of England. In this department we observed some enlarged drawings of the hop fungus—a very destructive growth on the hop—by Dr. Plomley, of Maidstone. Had a like plan been generally adopted, we might have had some interesting observations on the diseased conditions of food which sometimes play such dreadful havoc, as in the case of the potato disease. In the chemical department we found a glass case illustrative of the making of beer in this country. It would, indeed, be a blessed time for this beer-drinking country if all its beer were made from the materials exhibited here. Malt on one side, hops on another, a glass cask of porter on another, and a glass cask of ale on the other, revealed the true receipt of how to make good beer. Beer reminds us of the section of "intoxicating drugs, fermented liquors, and distilled spirits;" which, although some persons regard them as belonging to the class of poisons, were placed by the executive committee under the class "Food." The distilled liquors and wines exhibited here must have been from "unusual sources." There were, however, a few bottles of what, judging from the outside, looked like genuine champagne. Whether the grape be an unusual source for champagne or not, there are few persons who will deny that rhubarb *is:* and amongst the few wines of the Exhibition, this rhubarb champagne deserves a passing notice. Vain, however, must be the hope of wine-makers to get any substitute for the juice of the grape until they shall meet with something which contains the same compounds as the berry of the grape. In this department, the lovers of tobacco might regale their eyes and nostrils with an exhibition of the various forms which that substance assumes for the indulgence of its admirers. Of course, smoking was not allowed; and the tobacco on the British side, in the form of snuff, was not in a condition to be applied to the olfactory nerve. But the snuffers were better off than the smokers in the Exhibition: for there were no frowning notices in seven different languages forbidding them to indulge in their favourite luxury,—and the liberality of the Portuguese exhibitors of snuff had provided for every visitor a pinch. We understand from those who are judges that this Portuguese snuff was very excellent, and likely to produce a sensation in the snuff-taking world.

From snuff and tobacco the transition is natural to tea, coffee, and chocolate. The exhibition of tea was quite on a small scale:—a few samples of the different varieties of black and green from Assam constituting all that was to be seen in Class III. We have not yet sufficiently explored India and China, to say what these countries might exhibit. The specimens mentioned are, however, interesting, as indicating that tea may be grown in our Indian possessions, and may ultimately become a source of great commercial advantage to ourselves, and benefit to India. In coffee there was more than was novel. One exhibitor separated a quantity of useless vegetable tissue from the coffee, and thus secured a purer form of the raw material. Dr. Gardiner, of London, has discovered that the leaves of the coffee plant contain *caffeine,* a principle identical with that obtained from tea-leaves, called *theine.* It is generally admitted that these principles are the source of the utility of both coffee and tea as articles of diet. Dr. Gardiner proposes to dry the

coffee-leaves, and use them as we do tea-leaves. As he has procured a patent for his process of preparation, we suppose we may expect shortly to hear something more of this discovery. In addition to coffee, we had several exhibitors of chicory; so that people may become acquainted with the appearance of that which in their coffee they appear so constantly to taste. The produce of the cocoa tree (*Theobroma Cacao*) had numerous exhibitors. The seeds of this plant contain an active principle called *theobromine*, in addition to a fixed oil and other alimentary substances. Ground down, these seeds form cocoa paste. Mixed with vanilla, they constitute chocolate. When sugar is added, the chocolate has an agreeable taste; and it is used very extensively as an article of diet in France. It is gradually finding its way into England; and various Paris manufacturers competed here for notice and favour from the English, who might be disposed to try this new food. Hitherto the English have too much regarded this substance as a substitute for tea and coffee. That it is so, there can be no doubt, as it possesses the principle *theobromine;* but it is something more, and contains nutritive ingredients which are not found in either tea or coffee. The Exhibition served to call more attention to chocolate as an article of diet. Before leaving this subject, we would call attention to some specimens of Paraguay tea (*Ilex Paraguaensis*), which is the only substance that in any part of the world can be fairly said to compete with tea, coffee, and chocolate. It is curious that this plant is found to contain a principle identical with *theine*. It is used for making tea by the natives of South America. It would make a good and cheap substitute for tea in this country, but it is not allowed to be imported.

We extract the following notices from the juries' reports:—

PRESERVED ALIMENTARY SUBSTANCES.

It is impossible to over-estimate the importance of these preparations. The invention of the process by which animal and vegetable food are preserved in a fresh and sweet state for an indefinite period, has only been applied practically during the last twenty-five years, and is intimately connected with the annals of Arctic discovery. The active measures taken to discover a north-west passage, and to prosecute scientific research in all but inaccessible regions, first created a demand for this form of food; and the Admiralty stimulated the manufacturers to great perfection in the art. As soon as the value of these preparations became generally admitted in cold climates, their use was extended to hot ones, and for the sick on board ship under all circumstances. Hitherto they had only been employed as a substitute for salt beef or pork at sea, and, if eaten ashore, it was at first as a curiosity merely. Their use in hot climates, however, speedily became evident, especially in India, where European families are scattered, and where, consequently, on the slaughter of a large animal, more is wasted than can be consumed by a family of the ordinary number. The consumption of preserved meats became at once enormous; hundreds of tons are annually exported to the East Indies and all our colonial possessions, and many are consumed by our fleets. The cheapness of these preparations is most remarkable. This arises from the processes and materials for the cases being inexpensive, and from there being no waste of the meat: all that is good goes into the case, which is always filled. It is affirmed by the manufacturers and others, and probably with truth, that meat in this form supplies troops, and the fleet, with a cheaper animal diet than salt provisions, from avoiding the expense of casks, leakage, brine, bone, shrinking, stowage, &c., which are all heavy items, and entail great waste and expenditure; added to this, the damage of one cask of salt meat risks the loss of all its contents, whilst the meat canisters are, comparatively speaking, imperishable, and an accident to one occasions a loss of at most but from two to four pounds of food.

Several hundred canisters of meat were exhibited from various countries, and in some

of these by many different persons. Their merits were tested by a selection from each: the cases were opened in the presence of the jury, and tasted by themselves, and, where advisable, by associates. The majority are of English manufacture, especially the more substantial viands; France and Germany exhibiting chiefly made dishes, game, and delicacies—of meat, fish, soups, and vegetables. The jury desire to draw attention to the fact of viands of this description being extensively prepared in Australia, Tasmania, the Cape of Good Hope, Canada, &c., of equally good description with the English. Animal food is most abundant and cheap in some of those colonies. In Australia, especially, during seasons of drought, it is wasted in extraordinary quantities; flocks are slaughtered for the tallow alone, and herds for their bones and hides. Were the meat on these occasions preserved, it cannot be doubted that it could be imported into England, and sold at a cheaper rate than fresh meat in our metropolitan markets, to the great benefit of the lower classes. Among all the preparations exhibited by France, England, &c., there is no perceptible difference either in the mode or perfection of preservation. To seal, hermetically, full tin canisters is the general principle adopted; and it is effected by plunging them in boiling water, and soldering; a small orifice left purposely, by which all the air is expelled; this principle, variously modified, being the same throughout. The contents of all the cases, of whatever kind, have lost much of the freshness in taste and flavour peculiar to newly-killed meat; they are always soft, and, as it were, overdone; the nutritious principles are, however, perfectly preserved. As nutriment, they are unexceptionable; they are wholesome and agreeable, and often pleasantly flavoured. Vouchers were given for some of the samples tasted by the jurors having been preserved for twenty-five years and upwards: these were in a perfectly sound state, and did not perceptibly differ from the contents of canisters only a few months old. So long as the sealing remains sound, the viands appear to undergo no change. Any difference between the contents of the properly-prepared cases is to be attributed to the state of the food before preparation, or to the cooking, and not to the method employed for preserving, which is simple and universally applicable. Vegetables, preserved in a similar manner, have been considered by the jury with the animal food. Generally speaking, their flavour is fresher than that of the meats; especially in the case of those abounding in saccharine principle, as beet, carrots, parsnips, salsify, which preserve to advantage. The more farinaceous do not preserve so well, such as green peas, &c.; whilst those abounding in volatile oils are hardly worth preservation at all (especially cabbages, turnips, and celery), except as anti-scorbutics.

Mr. E. Mason's dried compressed vegetables demand especial notice, as shewing one of the remarkable discoveries of modern times in this branch of manufacture: they have been awarded a council medal. By Mr. Mason's process the most bulky, soft, and succulent vegetables are reduced to a fraction of their volume, and are preserved in a dry, indestructible state. After boiling for a rather longer time than usual, they are restored to something of their original form and consistence, retaining all their nutritious principles, and much of their flavour. Chollet & Co., the manufacturers of these preserved vegetables use only dessication and compression in the process, which is Mason's invention. According to a statement published in the "Comptes Rendus," as read before the Paris Academy, the vegetables are reduced seven-eights in weight, and proportionally in bulk. They require to be boiled for one hour-and-a-half to one hour and three-quarters, and on cooling are found to have regained nearly all their evaporated juices. If, as the jurors have reason to believe, these preparations retain their good qualities for several years, they cannot be too strongly recommended to public attention. It would probably be necessary for long voyages, that these square cakes be packed in perfectly dry casks or tanks as biscuits are. In the British Department, J. H. Gamble, and Ritchie,

and M'Call exhibit very fine samples of preserved viands and vegetables, and to each a prize medal is awarded for excellence of material and preservation. Ritchie and M'Call's deserve especial notice for the great size of the pieces of meat, combined with all the firmness of texture that is attainable. All are said to be prepared by Goldner's process, the results of which are equal, but not superior to the ordinary process, as far as the jury could decide, after a very protracted examination and comparison. A preserved pig, entire, a conspicuous feature in the English Department, deserves notice as a remarkably successful instance of curing on a large scale.

Canada deserves a very prominent mention for the abundance and excellence of the preserved viands exhibited; but all are of the ordinary description of cured meats, and none have any particular merit or novelty to entitle them to reward, except the hams of G. Reinhardt, of Montreal, which have been awarded a prize medal. There are barrels of beef, pork, and tongues, cases of smoked hams, bacon and sausages, kegs of lard, &c., all produced at a remarkably cheap rate. Numerous other articles were noticed by the jury, some with honourable mention, and some with the distinction of prize medals. Excellent preserved salmon was exhibited by New Brunswick and Nova Scotia; preserved fresh meats from Australia in all respects equal to the English; admirable boiled mutton in tin cases by the Newcastle Preserving Company, no whit inferior to the English. Van Diemen's Land sent excellent hams and preserved meats; New Zealand furnished dried mullets, while store of salt beef and pork travelled to the general mart from the Cape of Good Hope. In short, the abundance of good cheer that was displayed on every side, would have more than sufficed to furnish a hundred such bridal feasts as were spread out by the rich Comacho before the wondering eyes of the delighted Sancho Panza, as the illustrious Cid Hamet has recorded in his most entertaining history. Of a more *recherché* and delicate quality were the contributions from the land of the Gaul, the land of exquisite cookery and scientific *gourmandise*, differing from those of England, in being articles of luxury rather than of common use. Meat, fish, and vegetables, with their various combinations of savoury sauces, were delicately offered to the taste of the experienced connoisseur. Austria supplied a *quantum suff.* of solid fare, hermetically sealed; and moreover dispatched a flight of preserved larks, which obtained honourable mention from the gentlemen of the jury. Spain acquired a prize medal for her hams of Montanchis, sent from the Borough of Aviles. D. H. Carstens, of Lubeck, had a prize medal awarded to him for his tin cases of provisions. Switzerland, with the thrifty economy natural to her people, exhibited fish and meats, dried and preserved in a fresh state by simple dessication, a remarkable peculiarity, and one which obtained a prize medal for the inventor, H. Baup. The specimens, however, wanted flavour, and were discoloured, although perfectly fresh and sweet. Simplicity and cheapness were the great recommendations of these articles. Russia exhibited fish, apparently in excellent condition. The United States were unrivalled in their display of hams, which were declared by competent judges to be unsurpassable. Two prize medals testified the approbation of the jury on this subject, to Charles Duffield, of Louisville, and Schooley and Hough, of Cincinnati. The *cream*, however, of American produce, was the meat-biscuit of Gail Borden, a more concentrated food than which was never brought before the public. The exhibitor combined the best wheat flour with the nutriment of the finest beef, and presented them for use as food in the form of a dry, inodorous, flat, brittle cake, which will keep dry for an unlimited period. It only requires hot water and seasoning to the taste to produce a first-rate, agreeably-flavoured, highly-nutritious soup, somewhat of the consistence of sago. One pound of the biscuit grated, and boiled in a pint of water, forms a rich nutritious soup. It is averred by the inventor, and he was supported by authority satisfactory to the jury, that ten pounds of this substance, with

a proper allowance of water, afford, both in bulk and nutriment, food sufficient to support the physical and mental powers of a healthy working man for a month. A council medal was awarded to the inventor.

The osmazone exhibited by G Warriner, is the nutritious matter or juice of meat, which is set free during the operation of boiling down fat for tallow in Australia. This is afterwards concentrated, and preserved in the form of sausages. A great amount of nutriment is thus obtained in a portable form, and when boiled with gelatine, it forms a palatable diet. The price is very moderate, one shilling per lb., and it hence commands a market, and is much used to form a gravy-meat. The exhibitors declared that one pound weight is equivalent to the nutriment of thirty lbs. of fibrine, which argues a high economic value. Several specimens of preserved milks were submitted to the inspection of the jury. Of these, the concentrated preserved milk of E. D. Moore, received a prize medal. It contains all the nutritious qualities, and much of the flavour of fresh milk. Russian caviare, of the finest quality, was exhibited by Nikita Vsevolodowitch Vsivolosjky, and received honourable mention. Borneo and Singapore both supplied Trepang, or sea-slugs, in considerable abundance, no doubt a very delicate morsel, as we may also suppose are the swallow's nests, which the Chinese exhibited, of first-rate quality. Shark's fins, too, of which the Chinese are extravagantly fond, were also largely exhibited. Leaving these dainties, however, we arrive at the elegant manufacture of Nature's own artisans, whose unfailing excellence and chemical achievements no human art or industry has ever yet attempted to rival. Honey, from various quarters of the world, including that from far-famed Hymettus, was submitted to the inspection of the naturalist; and many specimens received prize medals or honourable mention. The next article which attracted our attention was entitled "Preparations from Blood," and we confess it awakened in us somewhat of antipathy and disgust, familiar as our more homely tables have long been with the occasional display of—

"Black puddings, proper food
For warriors that delight in blood."

The jury, however, has succeeded in describing the dish as so dainty a one, so nutritive, and so economical, assuring us at the same time that its inventor, P. Brocchieri, was deemed worthy of honourable mention, that we do not hesitate to promise that we will ourselves taste of his dish, should it ever come before us, and pronounce accordingly on its merits, or otherwise, as the case may be. Isinglass, as exhibited by Dr. MacClelland, obtained the honour of a prize medal; and with this announcement we close our remarks on the important and popular subject of Food.

CHAPTER XIII.

WORSTED, ALPACA, AND MOHAIR MANUFACTURES.

EARLY USE OF WOOL IN ENGLAND—THE MOTHER OF ALFRED THE GREAT—EDWARD THE ELDER—FULLER'S CHURCH HISTORY—THE GOLDEN FLEECE—DUTCH WEAVERS—NORWICH—BRADFORD—HALIFAX—THE ALPACA—MOHAIR—RUSSIAN MANUFACTURE—FRENCH ARTICLES—ENGLISH MACHINERY—IMPROVED STATE OF SOCIETY.

The term "worsted stuffs," is applied to those manufactures, into the composition of which wool enters, that have undergone the process of *combing*, and includes those fabrics

in which wool, thus combed, is combined with cotton and with silk. The name "worsted" is derived from a village in Norfolk, where these goods were first produced. These fabrics are to be distinguished from "woollen cloths," the chief characteristic of which is, that they undergo the well-known process of "felting" or "fulling." In opening up a number of fleeces, a distinction is easily observable between the wool of short and that of long staple. The short wool, if examined by a microscope, is noticeable for the immense number of little feathery serrations, or imbrications on its surface, which enable the individual fibres to be locked into one another by the felting process; and this wool is accordingly most used for the production of woollen cloths. The longer wool does not possess these serrations to the same extent, and is better suited for combing, the object of which is to unravel all the fibres, and lay them smooth and even. From the earliest times of English history, wool has always been regarded as our great national raw material for woven goods. The mother of Alfred the Great is described, like the virtuous woman spoken of in the Book of Proverbs, as busying herself diligently in spinning wool. Of Edward the Elder, an old chronicler tells us, that whilst "he sette his sons to schole, his daughters he sette to wool-werke." Nor was wool regarded with less favour by our early sovereigns as a means of replenishing the royal exchequer. No subsidies are more common as granted to the crown, than those on wool, and no articles more frequent subjects of legislative interference than wool and its manufactures. Amongst other instances of the wisdom of our ancestors it was at one time provided that no wool "should be sold by any man of Scotland, or to any other to carry into Scotland," under pain of life and member. A paternal government attempted to regulate the length, breadth, quality, and price of the cloth to be produced, and prescribed the wages and diet of the artificers. There seems little doubt that the first great impulse to our manufactures from wool of all kinds was given by the prudence and patriotism of Edward III., who encouraged cloth-workers from Flanders to settle in Norfolk, York, Kendal, and other places. It is scarcely to an ecclesiastical writer that we should look for manufacturing details; yet the witty Fuller, in the third book of his *Church History*, so pleasantly describes this event, that I am sure our readers will pardon us for transcribing the passage:—"The king and state began now to grow sensible of the great gain the Netherlands got by our English wool: in memory whereof, the duke of Burgundy, not long after, instituted the order of the Golden Fleece; wherein, indeed, the *fleece* was ours, the gold theirs, so vast their emolument by the trade of clothing. Our king therefore resolved, if possible, to reduce the trade to his own country, who, as yet, were ignorant of that art, as knowing no more what to do with their wool than the sheep that wear it, as to any artificial and curious drapery; their best clothes then being no better than friezes, such their coarseness for want of skill in their making. But soon after followed a great alteration, and we shall enlarge ourselves in the manner thereof. The intercourse now being great betwixt the English and the Netherlands (increased of late, since king Edward married the daughter of the earl of Hainault), unsuspected emissaries were deployed by our king into those countries, who wrought themselves into familiarity with such Dutchmen as were absolute masters of their trade, but not masters of themselves, as either journeymen or apprentices. These bemoaned the slavishness of these poor servants, whom their masters used rather like heathens than Christians; yea, rather like horses than men! Early up and late in bed, and all day hard work and harder fare (a few herrings and mouldy cheese), and all to enrich the churls their masters, without any profit unto themselves. But, Oh! how happy should they be if they would but come over into England, bringing their mystery with them, which would provide their welcome in all places! Here they should feed on fat beef and mutton, till nothing but their fulness should stint their stomachs; yea, they should

feed on the labours of their own hands, enjoying a proportionable profit of their pains to themselves; their beds should be good, and their bedfellows better, seeing the richest yeomen in England would not disdain to marry their daughters unto them; and such the English beauties, that the most envious foreigners could not but commend them. Liberty is a lesson quickly conned by heart, men having a principle within themselves to prompt them, in case they forget it. Persuaded with the premises, many Dutch servants leave their masters, and make over for England. Their departure thence (being picked here and there), made no sensible vacuity, but their meeting here all together amounted to a considerable fulness. With themselves, they brought over their trade and their tools; namely, such as could not as yet be so conveniently made in England. Happy the yeoman's house into which one of these Dutchmen did enter, bringing industry and wealth along with them. Such who came in strangers within their doors, soon after went out bridegrooms, and returned sons-in-law, having married the daughters of their landlords who first entertained them. Yea, those yeomen in whose houses they harboured soon procceded gentlemen, gaining great estates to themselves, arms and worship to their estates."

There is no doubt that the manufacture of worsted stuffs was introduced or improved at this time, for, in the account of exports in the twenty-eighth year of Edward the Third's reign, we find mention of "8,061½ pieces of worsted, at 16*s*. 8*d*. per piece." The county of Norfolk became then, and continued for four centuries, the main seat and centre of the trade. So great, indeed, became the prosperity of the city of Norwich, that when Queen Elizabeth visited it in 1578, we are informed by the city records, that a grand pageant was exhibited, representing seven looms weaving worsted, russets, darnic, &c., with various devices; and that her majesty particularly examined the knitting and spinning of the children, perused the looms, and noted the several works and commodities that were made. The manufacturing processes at this period were characterised by the most primitive and arcadian simplicity, and a degree of "slowness" which, in these railway times, we can scarcely realise. The work was entirely domestic, and its different branches widely scattered over the country. First, the manufacturer had to travel on horseback to purchase his raw materials amongst the farmers, or at the great fairs held in those old towns that had formerly been the exclusive markets, or, as they were called, "staples" of wool. The wool, safely received, was handed over to the sorters, who rigorously applied their gauge of required length of staple, and mercilessly chopped up by shears or hatchet what did not reach their standard, as wool fit only for the clothing trade. The long wool then passed into the hands of the combers, and having been brought back by them in the combed state, was again carefully packed, and strapped on the back of the sturdy horse, to be taken into the country to be spun. For this end the West Riding manufacturer had not only to visit the villages in the immediate neighbourhood of Halifax, Bradford, &c., but used periodically to traverse the romantic hills and dales of Craven. Here at each village he had his agents, who received the wool, distributed it amongst the peasantry, and received it back as yarn. The machine employed was still the old one-thread wheel, and in summer weather, on many a village-green and hill-side, might be seen the housewives plying their busy trades, and furnishing to the poet the vision of "Contentment spinning at the cottage door." Returning in safety with his yarn, the manufacturer had now to seek out his weavers, who ultimately delivered to him his camlets, or russets, or serges, or tammies, or calimancoes (such were then the names of the leading fabrics), ready for sale to the merchant or delivery to the dyer. It was in the year 1790 that the first spinning-jenny was put up in Bradford, in the private house of Mr. Garnett, a spinner, whose family still maintain a deserved eminence in the trade. Of course it was worked by hand. About the same period, similar

machinery was introduced into Halifax and the neighbourhood. The first factory erected in Bradford was in 1793, and loud and manifold were the predictions of ruin that accompanied it. The extension of machinery and the improvement of mill-yarn advanced slowly but steadily. From a variety of causes, the manufacturers of Norwich did not avail themselves of the improved processes which the invention of the spinning-frame and the application of steam power brought out; and, consequently, the spinning of worsted yarn passed gradually from Norfolk to Yorkshire; in which latter county such improvements in machinery have subsequently taken place, as have enabled the manufacturer of that district to bring his goods into the market against the rivalry of the whole world.

In the year 1836 a new raw material was brought into use in the Bradford trade, destined speedily to become one of its most important features. The existence of an animal called Alpaca, half camel and half sheep, had long been known to travellers and naturalists, and, indeed, tradition reports that Pizarro had brought back specimens of its wool on his first return from Peru, together with textures made from it by the natives. But up to the period mentioned, this wool, as an article of commerce, had attracted little notice; and to Mr. Titus Salt, of Bradford, belongs the honour of having properly estimated its capabilities, and perfected its adaptation. The animal is of the Llama tribe, and is found only in the mountainous regions of the southern part of Peru, the table-land about four hundred miles from the sea-coast. It cannot live in the low lands near the sea. It is gregarious, but not kept in large flocks like sheep, and requires considerable care. The attempts to naturalise this animal in England have not hitherto been succcessful. His Royal Highness Prince Albert, with his characteristic patriotism and love of science, has paid much attention to its culture and adaptation to our climate; but his efforts have not realised the result we could have desired. The late earl of Derby's flock, now in the hands of Mr. Salt, are thriving; but still it is doubtful whether the alpaca will ever become a stock animal in this country. The humidity of our climate is generally believed to be the main cause of our failure. Some years ago, six hundred alpacas were shipped from Peru to Liverpool; but so unskilfully had the arrangements been made for their accommodation, that only six survived the voyage. Alarmed at this shipment, the Peruvian government issued an edict, prohibiting their exportation for the future; and when, last year, some enterprising Australian colonists attempted to procure a cargo, they were obliged to return disappointed. The wool, or hair of the alpaca is of various shades of black, white, grey, brown, &c., and is pre-eminently distinguishable for its brightness and lustre, its extreme softness, and great length of staple. A specimen, shown in the Great Exhibition by Messrs. Walter Milligan and Son, of Bingley, was forty-two inches in length; but this must have been of many years' growth. Considerable difficulties were at first experienced in the working-up of this material into yarn, but patience, perseverance, and skill, ultimately overcame them; and at the present time, in combination with warps of cotton or of silk, it forms an amazing variety of articles of great richness, softness, and beauty. The advance in its consumption may be estimated from the fact, that whilst, in the five years from 1836 to 1840, only 560,000 lbs. per annum were imported, last year the import had reached 27,331 ballots, or 2,186,480 lbs. weight: and the advance in price has been from 10*d.* per lb. in 1836, to 2*s.* 6*d.* per lb. in 1852.

Nearly contemporaneous with the introduction of alpaca wool, was the bringing into general use in Yorkshire of an article, similar in many of its properties—mohair, or goat's wool. This article is of very ancient use in manufactures, having been employed, as we are taught in the Book of Exodus, for the furniture and covering of the Jewish Tabernacle. The wool is grown in the neighbourhood of Angora, in the centre of

Asia-Minor, and is brought from thence on the backs of camels to Constantinople for shipment. It is singular that, although many attempts have been made to extend its growth beyond this immediate district, they have hitherto entirely failed. Formerly yarn was spun by hand in Turkey itself to a large extent, and exported to France; but English-spun mohair yarn has now entirely superseded it. The export of this yarn to France in 1850, amounted to 400,000 lbs; and in Germany its consumption is greatly increasing. It is manufactured in Yorkshire, chiefly into articles for ladies' dresses, of great softness, lustre, and brilliancy. It will be readily conceived that the introduction of these new raw materials, added wonderfully to the capabilities of the manufacture, and increased immensely the number and variety of the fabrics produced. In the mean time, great improvements were made in machinery, and the result has been the opening of new branches of industry, and the quadrupling, within thirty years, the number of work-people employed. In the town of Bradford alone, the population has arisen within the last fifty years, from 13,264 to 103,782. The consumption of the various manufactures produced is immense. The total quantity of yarn spun may be estimated at about 57,000,000 lbs., which would require about 100,000,000 lbs. of fleece wool. Among the many advantages of the late Great Exhibition, none was more striking than the opportunity it afforded of studying the comparative capabilities of our own and other countries. Englishmen were taught the useful lesson that we possess no monopoly of inventive genius or practical skill; and that to maintain our position, it is indispensable that we spare no effort, and relax no energy. "I had the honour and pleasure," says an able lecturer, "to serve as vice-chairman of the jury charged with the examination of the goods included under Class XII.; and, along with Mr. George Tetley, of Bradford; Dr. Hermann, of Bavaria, and Mr. Bernonville, of Paris, I inspected the various fabrics produced by our own and the continental worsted manufacturers. The result of this investigation was, on the whole, highly creditable to English industry, whilst, at the same time it afforded useful suggestions for the future. It was curious and interesting to notice some worsted fabrics of great beauty, sent from Russia, a country we have never heretofore regarded in the light of a manufacturing rival. Amongst these were specimens of a cloth of great softness and fineness of texture, said to be spun and made by hand, from camel's or goat's hair, by the Bashkirs, a wandering and half-savage tribe on the banks of the Caspian Sea:—these were really wonderful, as showing what, after all, with the very simplest and rudest machinery, the human hand is capable of accomplishing."

It appeared to the jury that as to the fabrics composed of wool mixed with cotton, and the alpaca and mohair goods, there were no goods produced on the continent that could at all compete with the English manufactures. The second conclusion was, that whilst there were some Bradford goods of very fine qualities that were, of their particular description, unsurpassed in excellence of manufacture, yet that there were no double-twilled merinos of English manufacture exhibited; and that in these merino fabrics, and other goods designed for the use of the wealthier portion of the community, our French neighbours maintained their pre-eminence. We must not forget to mention, while speaking of French manufactures, some figured or fancy goods from Roubaix, which were of beautiful design and exquisite workmanship. It is, indeed, in the department of design that our English deficiencies are most apparent; and no greater benefit could be rendered to the worsted trade than the introduction of a purer and more cultivated taste, not only among the producers, but also the consumers of our fabrics, by an extension and improvement of our plans of art-instruction; which is mainly to be done by indoctrinating the pupil with the true principles of art, and placing before him specimens illustrative of the right application of these principles to the specialities of his own particular

manufacture. One point more remains to be briefly dealt with. We have seen the various improvements and inventions which, following each other in such quick succession, have brought the worsted trade to its present point of progress and prosperity. There can be no question that these have developed our national resources, and added to our national wealth; but what has been their influence on the great masses of the people employed in the manufacture? We know it may be said that the landowner has been benefited, for his rental has been largely augmented; that the farmer has derived great advantage, for his wool has been increased in quantity as well as raised in price; that the manufacturer himself has attained to wealth and eminence. But what have been their results, economically, socially, and morally, on the toiling thousands dependent on the trade for their daily bread? We have described the processes of manufacture carried on towards the close of the last century, before the introduction of machinery and steam power. There are some persons who affect to look back upon that period with regret, and lament over the loss of domestic comfort, simple manners, and social happiness, which, they say, our manufacturing system has caused. And they delight to draw a glowing picture of the time when, amidst the quiet scenes of nature, far from the smoky town and the clatter of machinery, the spinner and the weaver followed their honest calling in the bosom of their families; not wasted in their physical strength by excessive toil, nor ground down to the dust by the rapacity of tyrannical masters, but earning a comfortable competency by moderate labour; not a turbulent, infidel, and chartist, but a contented, religious, and loyal peasantry.

Such a picture is a fable, not a fact. There can be no question, from all the records and traditions of the trade, that the physical comforts of the artisan have been vastly increased, and his social position greatly elevated. In 1787, the average rate of wages was 3*s*. 3*d*. per week, when a stone of flour, weighing 16 lbs., cost the working man from 3*s*. to 3*s*. 6*d*. At the present time, with flour at 2*s*. per stone, with other articles of provision reduced in proportion, with articles of clothing one-third at least of their former price, the average wages at Bradford of the factory-workers, men, women, and children, is 10*s*. per week. Nor is the amelioration in their social condition less real, although there is still great room for sanitary, for educational, for religious improvement. If there are grasping masters, men ignorant or regardless of their high moral obligations, they are the exception, not the rule. There are many noble "captains of industry,' between whom and their work-people there is some other connexion than a mere money-payment; who study to promote their welfare and elevation, and whose efforts are met by a frank confidence and a grateful recognition. There are thousands of homes in the West Riding, where not only honest labour meets with its due pecuniary reward, but where comfort, cleanliness, and intelligence prevail; homes radiant with happiness, and many of them hallowed by religion. We shall now, with all due acknowledgment, take our leave of the able lecturer from whose discourse we have selected the foregoing remarks, and, in concluding our present chapter, briefly remark that the jury, in testimony of their high approbation of the various specimens offered to their examination, awarded prize medals to no fewer than forty-seven exhibitors of worsted manufacture.

CHAPTER XIV.

GLEANINGS AND REMINISCENCES.

SECURITY OF PROPERTY—AMAZING POPULARITY OF THE EXHIBITION—A ROMANCE IN THE RUSSIAN DEPARTMENT—NOTABILIA—THE COLOSSAL CROSS—THE GREAT COAL—ITALIAN WONDER AND AMERICAN INGENUITY—HOUSE OF CAOUTCHOUC—THE PALETOT-BOAT—THE BRASS TAILOR.

Under this head we shall, from time to time, record such incidental events connected with the brief but glorious existence of the Crystal Palace as may, we hope, prove not altogether uninteresting to our readers. We shall also, without any attempt at classification, occasionally describe such of the more remarkable objects as, in the rich profusion that was everywhere scattered around, may have escaped our earlier attention. Indeed, such was the apparent inexhaustibility of that wondrous collection that, on a retrospective glance, the mind despairs of comprehending it as a whole; but now that the glorious vision has passed, now that the excitement has cooled, and visitors from foreign parts and quiet country places have reached their homes; now that the splendid trophies of human ingenuity and enterprise have returned to their respective owners, and that vast array of wealth and grandeur is dispersed, we begin to faintly realise the magnitude and purpose of the Great Industrial Bazaar. The Exhibition of the Industry of all Nations having finally closed, we are enabled to look on its results as matters of history, and recall the various events of those eventful months with a somewhat calmer and more philosophic spirit. Two reflections arise out of the mass, which, above all the rest, will read the world a great lesson. The first, that thousands of people, gathered from every civilized corner of the earth, speaking different languages, brought up under different modes of government, exercising different forms of religion, and putting faith in different creeds, passed daily through the noble edifice, not only without accident or mischief, but positively without inconvenience to themselves. The people were their own police; and the six millions went, and wondered, and departed in good-will and peace. History records no fact like this. Not less surprising or less suggestive, is the amazing thought that seventeen thousand exhibitors, who, like the visitors, were of almost every nation and kindred under heaven, entrusted the most valuable evidences of their wealth, their skill, their industry, and their enterprise, to the guardianship of some fifty policemen, armed with no better weapon than a wooden baton, and earning wages but little superior to that of the day-labourer. Day after day and night after night passed on, and no added force was requisite for the safety of the almost countless wealth deposited within those fragile walls. One can scarcely comprehend the strength of so much confidence and reliance on the law and order of Great Britain. In no other country of the world could such an exhibition of the industrial arts have taken place. Do we say this boastingly, or of a vain spirit? No; rather let us humble ourselves before the Throne of Mercy, and be thankful that it has been vouchsafed to us in our generation to lead the peoples onward in the march of peaceful enterprises and industrial triumphs.

The exceeding popularity of the Exhibition eventually became its greatest wonder, and many who went there to study the marvels of manufacturing skill could only gaze at the multitudes which they attracted to Hyde-park. There is a magnetic power about large masses gathered in one vast edifice, and swarming in happy excitement along spacious avenues, where their numbers tell upon the eye, which eclipses every other spectacle, however splendid or interesting. Man is superior to the choicest examples of his handiwork, and never were vast assemblages seen in a situation more imposing.

Those who witnessed the aspect of the building on a crowded shilling-day will not readily forget the strange and indescribable sensations with which it inspired them. Who can say that we shall ever be able to witness such a sight again? It is not a small excitement which drags up humble provincials *en masse* from the country—which induced an old woman of eighty-four to travel on foot all the way from the Land's-end—which sent a bushel and a half of watches in one night to the shop of a single pawnbroker in Leeds, and which so stirred the heart of private benevolence throughout the kingdom that even our charity schools and the inmates of our workhouses, were largely represented at this Jubilee of Industry. On the ground, therefore, of popular excitement alone, few of us can expect to see the renewal of such a spectacle. Books may supply us with the fullest information on the subject, but they can never touch the heart or stamp their lessons upon the memory like a personal inspection of this wonderful display. For ourselves we have always felt our powerlessness in dealing with the details of a collection so vast and comprehensive. An Exhibition which embraced every kind of industrial product cannot be grasped within reasonable limits, and a history of it, if attempted, would exhaust the patience of the most indefatigable reader. The bare classification of objects occupies eighteen closely-printed foolscap pages. The power of discussing advantageously each division of that immense classification involves a minute knowledge of every art to which the ingenuity and the labour of mankind have been directed, and is plainly impracticable. For the determination of excellence in each department the public may, however, be most safely and authoritatively referred to the awards and reports of the different juries. There are, notwithstanding, general results which it comes fairly within the province of the historian to point out; particular inventions, to indicate the importance of which justifies a special notice, and lessons of experience for the guidance of our future industrial career which ought not to be lost sight of. Many of these topics have from time to time been touched upon. Others may occasionally suggest themselves; and we shall endeavour to trace out the full significance of the objects that were brought before us, and gather up the threads of interest which the spectacle presented.

A ROMANCE IN THE RUSSIAN DEPARTMENT.

We have some doubts whether the Exhibition was ever so interesting in detail since the 1st of May, as it was within two or three days of the opening. Two days before it opened, the fulfilment of the pledge to the public appeared physically impossible. The place was strewn over with fragments and saw-dust, and boxes and cases, packed and unpacked. Hundreds of fittings had yet to be finished; men were at work all over the counters, and up in the galleries, and on the roof, and over the floor; and there were not twenty yards of the whole area of twenty-six acres that looked in such a state of forwardness, as to justify a hope that they could be got ready in time for the opening. By what magical arts all these difficulties were overcome, the confusion cleared up, the hangings swung, the cases unpacked, the counters dressed, and the vast superficies decorated, and put in order for the ceremonies of the inauguration, we know not; and we are even sceptical as to the fact whether the people who accomplished these sorceries, are quite aware themselves how they did it. The confusion of the last two days was singularly picturesque. You could see the costumes of all nations running about in a state of flutter and disorder, that elicited an infinite variety of temperaments—the flash of the tropics, the languor of the south, the gravity of the oriental complexion, and the rough bluster of the north. Some were impetuous and choleric; whilst others, seated tranquilly on their unopened bales, waiting for instructions, looked on at the surrounding riot with imperturbable indifference. The incidents that were everywhere disclosed to you as you passed up the nave helped, also, to give a sort of dramatic

interest to the scene, and to set you speculating on the distant homes and associations of these people, and the community of pursuits and civilizing aims which had thus collected a multitude of men from the extremest points of the world under one roof, and for one express object. Little domestic under-plots, and quaint bits of pathos and fun, occasionally enlivened the bustle, or threw a scrap of pantomimic comedy into the silent corners of the Bazaar.

We remember an instance of this kind. It was just before the Exhibition opened, whilst most of the foreign departments were in a state of indescribable confusion. The Russian division was in the incipient stage of development; curious drums and trumpets, glittering ware and articles of northern *vertu,* had been delivered out of their boxes, and lay heaped about till the rest of the consignment should have arrived. There was a lull in the work; the men entrusted with the business were out, probably unpacking in the park; and the Russian chamber, in that condition of rich disorder, was left to the charge of a young girl. She was dressed town-fashion, and had none of the marks of the peasant about her, except a bright glow on her cheeks. She was handsome —that is to say, round-faced, with lively eyes, capable of a profound sentimental expression, (which seems, indeed, more or less common to all lively eyes,) and of a "comely shape." You would have almost guessed her country from the cast of her features; yet, notwithstanding the Russian snow she came of, she gave you to understand at the first glance, that there was blood in her veins as warm as ever danced in Italy. If one could make anything substantial out of such a fancy, we might have imagined that she was a neighbour of that river, "whose icy current flows through banks of roses." There she stood, keeping watch over the goods, and pretending to read a book. It was a mere pretence. From behind a temporary curtain suspended at the back, there peeped every now and then an English youth of one or two-and-twenty, with a dash of the juvenile *roué* in him, extremely well-looking, and fairly set out for conquest. He appeared to be connected with some of the adjoining states, but it was evident that while his business called him to one place, his love of adventure had fascinated him to another. The coquetry that went on between them, would have had a telling effect upon the stage. Young as they were, they understood how to flirt books and curtains as skilfully as any senhorita of Seville or Madrid ever flirted a fan. Her look aside, to show her consciousness, as it were unconsciously, was perfect; and the way the young gentleman affected to be looking very seriously at something else, while he was all the time directing an intense focal light upon her ringlets (which she felt as palpably as if it had lifted them up), was a picture which, with the lady in the foreground, might be recommended to the consideration of Mr. Frank Stone, who always hits off these exquisite inchoate sensations with the most charming truthfulness. They did not understand one word of each other's language, yet had already contrived, by the aid of a third language, with which they were both familiar, to get up a tolerably intimate acquaintance. We are sorry we cannot tell our readers how it ended; we hope happily for both parties, and that the lady did not leave her own inclement climate to find a more wintry region here! When the Romances of the Exhibition—with the Crystal Fountain for a frontispiece, as the trysting-place for lovers who wished to lose other people and find themselves—come to be published, perhaps we shall have the sequel of this little incident.

NOTABILIA.

Lord Brougham and the Great Exhibition.—This learned lord, who was opposed to the erection of the Crystal Palace, became at length persuaded of its usefulness. In presenting Mr. Paxton's petition to the Lords, he said:—"He had the honour of presiding

over the Society for the Diffusion of Useful Knowledge, and it was the intention of the society to present a petition in favour of this ally for the diffusion of knowledge. They considered it a serious rival to their adversary, the *gin palace*, because it would draw the people towards that which, whilst it entertained, also instructed, and must improve. He understood that two million and a quarter of persons had already visited the Crystal Palace, not more than one-fourth of whom had come from the country; and he could not help saying that, instead of seeing £2,500 a-day taken in shillings, he would rather see £200 received in pence.

Educational Adaptation of the Exhibition.—The proposition to make the Exhibition a means of popular education, by explanations and descriptive lectures, &c., was most favourably received, and the University of Oxford not only countenanced the scheme, but gave a series of lectures, in accordance with the idea in preparation for the general visit of the members of the University to the Exhibition. Professor Ansted announced a series of eight lectures on successive Friday and Saturday mornings, between the hours of nine and twelve o'clock, in explanation of the mining processes, mineral products, and manufactures forwarded for exhibition from various parts of the world. The first of these lectures took place on Friday, the 23rd of May, and was of an introductory character—treating of the general nature of the materials of which the earth is composed. He then discussed, in their order, mineral fuel, iron, other metals, stone, clay, various earthy minerals and gems. The number of his class was limited, and a detailed list of the objects illustrated was issued previous to each lecture. Lord Dufferin suggested that a number of the pupils of the Belfast School of Design should be sent to London to have the benefit of seeing the Great Exhibition. His lordship headed a list of subscriptions for the purpose with a contribution of £30.

The Exhibition Post-Office.—A "post" was erected in the centre of the south half of the transept, after the fashion of such as are used in Belgium. It was a hollow cylinder (tastefully decorated, and in imitation of bronze), with a mouth similar to that of a common letter-box in this country; the post times being inscribed upon a ticket inserted in the top of the "post." It was, we understand, intended to adapt this to the uses of the Exhibition establishment, which, we may here mention, included a post-office department, the business of which was very extensive, and was conducted by Mr. Osmond Jones. In this office, on an average, about 500 letters were dispatched daily, and about 300 arrived. Letters sent out were registered; and letters received were distributed to all the various parties engaged in the vast edifice. Posts arrived and left thrice a day—eleven, three and five. The Postmaster-general sent direct for the letter-bags, which did not pass through any branch office; and great acommodation was thus afforded to the public.

A graceful act of liberality on the part of his Royal Highness Prince Albert towards the young ladies, pupils at the Government School of Design, Somerset-house, is worthy of record. A few days before the opening of the Great Exhibition, the senior female students, (several of whom were exhibitors,) prepared a memorial to Prince Albert, praying that they might be present at the inauguration of the "world's fair" by her Majesty. The prince immediately replied to Mrs. M'Ian, the principal of the female branch of the school, regretting his inability to grant the free admissions required, but requested that the young ladies would accept a dozen season tickets, and that she would be pleased to present them to twelve of her most deserving pupils. Shortly after this communication from the prince, Mr. Redgrave, the principal of the male department, received from the Earl of Granville the following note:—"Bruton-street, April 29. Mr. Labouchere and I have much pleasure in offering twelve season tickets to the Government School of Design, if you will, with the other head-masters, select those students who

appear to you the most deserving. It will give *us* pleasure if these tickets give pleasure and instruction to those to whom you may allot them."

Purchases at the Great Exhibition.—Her Majesty among other acquisitions, purchased at the Exhibition a tiara of sapphires of great lustre and size, and a brooch, consisting of two enormous rubies, set round with diamonds, by Lemonniere, of Paris. At a meeting of the Goldsmiths' Company, a resolution was unanimously passed that the sum of £5,000 should be expended in the purchase of some of the magnificent plate exhibited at the Crystal Palace, for the use of the splendid hall. At a court of common council, Alderman Copeland brought forward a motion, "that a sum not exceeding £5,000 be voted from the city cash to purchase some of the works of art in the Exhibition of the Industry of all Nations, adapted for the decoration of the city of London."

A Commemorative Monument.—We extract the following from the columns of a popular journal.—(*To the Editor of the Daily News.*) Sir,—Your excellent article on the Exhibition in last Friday's paper has given much satisfaction to a large body of exhibitors, and all concur in the desirability of erecting a monument in commemoration, as suggested by you. Will you allow me to suggest another plan of doing this, viz., to purchase the Crystal Fountain—erect over it a temple, and let this be the memorial to coming ages, that on the spot occupied by it, thousands met each other "by appointment," during the great days of the Exhibition; and that it was not only the centre of attraction to many pilgrims who visited the building from afar, but the centre of the building itself. The commissioners might do a worse thing with a portion of their surplus fund than this, and their famous names might be engraved on brass within the portals of the temple itself. An inscription also should be placed there, showing how far east, west, north, and south the building extended from the centre, so that visitors might measure with their "mind's eye" the grand proportions of the Palace of Glass.—I am, Sir, your obedient servant,

Crystal Palace, October 13. A Lucky Exhibitor.

THE COLOSSAL CROSS OF THE GREAT EXHIBITION.

The public must remember the colossal cross, made of granite, which stood close to one of the entrances to the Great Exhibition, 1851. This immense piece of workmanship, which was hewn out of a solid block, and weighed upwards of ten tons, was brought over from Sweden, by an eminent merchant, named Carl August Kullgreu, who, falling sick and dying during the Exhibition, directed the cross to be placed over his remains, in the burial-ground of the Swedish church, Prince's-square, Ratcliffe Highway, which was accordingly done, and it there found its last resting-place. Its carriage from Hyde Park to its present site, cost £25. On the base is the following simple inscription —"Carl August Kullgreu, born at Sweden in 1793, and died in London, 1851."

THE GREAT COAL AT THE EXHIBITION.

This large block of coal was drawn out of one of the pits in the Hange Colliery, Tividale, near Tipton, belonging to Mr. Daniel George Round. Upon the first attempt being made, such was the great weight of the coal that the niche ring upon which the rope is wound broke through in two places, it being cast iron, six inches broad and one inch thick. A new niche ring being put on, a second attempt was made, when, amidst great suspense, the coal was brought to light, up a shaft 200 yards deep, in the space of three minutes. The waggons being run over the pit the coal was landed amidst the shouts and cheers of all assembled. The coal was then transmitted, by an inclined railway, about 300 yards, to the wharf, the colliers holding it back by ropes. It had to be brought to the bottom of the pit some considerable distance; the ponderous mass at

times breaking the cast-iron rails and sleepers forming the railroad, as it moved slowly along. The weight of the coal itself, exclusive of any chains, &c., is about five tons, ascertained by means of steelyards. When lifted to be weighed, the hook by which the coal was suspended broke through, being of wrought iron, $1\frac{1}{4}$ inch square. The size is 6 feet high and 18 feet in circumference, necessarily of a circular shape to admit it up the pit shaft; the largest size that could possibly be produced, and probably the greatest weight ever attempted to be drawn out of a mine, and must have been attended with great risk to the machinery and ropes. No other than the thirty-feet or thick coal seam of South Staffordshire could allow of such a large piece of coal being produced. Its height, upon the skip and waggon, is nearly nine feet. It is a fine coal, remarkably bright and clear. It formed a very interesting addition to the Great Exhibition, and attracted great curiosity. It is worthy of remark, that the services of the men were gratuitous in getting the coal and sending it from the mine to the wharf, thus showing the good feeling existing between Mr. Round and his workmen.

ITALIAN WONDER AT AMERICAN INGENUITY.

We translate the following amusing notice from the *Giornale di Roma,* the daily oracle of the eternal city:—Let us, says the astonished writer of this article, take a brief survey of American eccentricities in the Crystal Palace. First of all cast your eyes upon that case—it is no larger than an ordinary portmanteau—open it, and you will find therein an entire house of *caoutchouc,* which you may erect, wherever your roving fancy may lead you, upon a very slight foundation, which folds up into the smallest possible compass, no bigger than an umbrella. All necessary furniture for the establishment is packed in the same case—to wit, an excellent elastic mattrass which you may *blow up* at pleasure; small packets also, which with *a breath* you may convert into most commodious cushions. Is the evening fine and starlight—take that long band—it may be easily inflated into a luxurious sofa, upon which yourself and your whole family may sit at ease. In the course of your peregrinations, do you suddenly encounter a broad river, whose waters bar your further progress? You may navigate the stream: lay hold of that *paletot*—you never met with its equal before —it is no bigger than an ordinary *Mackintosh*—you would take it to be one—you may see one like it every day in Hyde Park, or in the Champs Elysée; no dandy appears without one. But feel in one of the pockets, you will find therein a small pair of bellows; apply the tube to a little opening, and suddenly your *paletot* swells out, changes its shape, and in a trice is transmogrified, to all intents and purposes, into an excellent, serviceable boat. A couple of oars lie hidden at the bottom of the wonderful case—you embark, seating yourself upon the same serviceable case, in which your house is contained—you pass the river, and your canoe resumes its original form. According to the temperature of the atmosphere it either remains on your shoulders, or disappears into its hiding place;—from the *container* becoming the *contained.*

A little further on, you stop before a small brass machine, about the size of a quart bottle; you fancy it is a meat-roaster: not at all. Ha! ha! It is a tailor! Yes, a veritable *stitcher.* Present a piece of cloth to it: suddenly it becomes agitated, it twists about, screams audibly—a pair of scissors are projected forth—the cloth is cut; a needle sets to work, and lo and behold, the process of sewing goes on with a feverish activity, and before you have taken three steps, a pair of *inexpressibles* are thrown down at your feet, and the impatient machine, all fretting and fuming, seems to expect a second piece of cloth at your hands. Take care, however, as you pass along, that this most industrious of all possible machines does not lay hold of your cloak or great coat; if it touches even the hem of the garment, it is enough—it is appropriated, the scissors are whipped out, and with its accustomed intelligence the machine sets to work, and in a twinkling

another pair is produced of that article of attire, for which the English have as yet been able to discover no name in their most comprehensive vocabulary. See now, how, with this wonderful case and this most extraordinary machine, a man may travel far and wide without the aid of his fellows. Add only to this small quantity of luggage one of those steam ploughs lately invented by the English, with which six shares are readily set to work, and you may plough your field up in a jiffy. Is it not astonishing, to travel, sleep, be clothed and fed without apparent assistance from human hands?

CHAPTER XV.

PRINTING FOR THE BLIND, FROM THE JURIES' REPORT.

INVENTED IN FRANCE—M. HAUY—M. GUILLIE.—M. DUFAU.—INSTITUTION AT VIENNA.—MR. GALL, OF EDINBURGH.—REV. MR. TAYLOR, OF YORK.—DR. HOWE, OF THE UNITED STATES.—PROGRESS OF THE DISCOVERY IN VARIOUS COUNTRIES.—STEREOTYPE OF THE HOLY SCRIPTURES.

The jury have noticed with pleasure the large number of exhibitors from England, France, the Zollverein, and the United States, of inventions and devices for the instruction of the blind. It has been estimated that, in the European countries, one person out of every 1,200 or 1,400 of the entire population is blind, and in America, one in every 2,000. The great and increasing attention that is paid to the intellectual and moral instruction of this unfortunate class is one of the distinctive features of the progress of our age. A few years ago, printing for the blind was considered only a curious or doubtful experiment; but it is now established beyond all question that books are true sources of profit and pleasure to them. Whilst embossed books have recently very rapidly increased, it is delightful to notice that the blind readers have multiplied far more rapidly. These circumstances have induced the jury to attempt a brief historical sketch of the origin and progress of printing for the blind, together with the present state of the art.

The invention of printing for the blind marks a new era in the history of literature. The whole credit of this invention, so simple, yet so marvellous in its results, belongs to France. It was M. Valentine Haüy, who, in 1784, at Paris, produced the first book printed with letters in relief, and soon after proved to the world that children might easily be taught to read with their fingers. It has been said by his biographer that he took his idea of embossed typography from seeing that Mademoiselle Parodis, a blind pianist of Vienna, who visited Paris that year, distinguished the keys of her instrument by the sense of touch, and also rapidly comprehended the maps in relief, which, a short time before, had been invented by M. Weisembourg, of Mannheim. After employing letters of different forms and sizes, and experimenting with the blind as to the precise shape of the letter that could be the most readily distinguished by the touch, he at length fixed upon a character differing very slightly from the ordinary Roman letter, or perhaps a little approaching italics. There was the usual mixture of the upper and lower case, the capitals taking more of the script form than the small letters. He submitted his first efforts and experiments to the Academy of Sciences of Paris. A committee was appointed to examine them, consisting of the Duc de la Rochefoucauld, M. Desmarets, M. Demours,

and M. Vicq-d'Azir, and their favourable report on the 18th February, 1785, rendered his success a triumph. Great *éclat* attended the public announcement of this invention. A new institution was established, called the Institution Royale des Jeunes Aveugles, and M. Haüy was placed at the head of it. Among the books which he embossed were a grammar, a catechism, small portions of the church service, and also several pieces of music. The printing of the music was inferior. The abbreviations which he introduced into his grammar, it has been said, did not afford sufficient advantages to counterbalance their inconvenience. His principal work is entitled *Exposé de differends moyens verifiés par l'expérience pour les mettre en état de lire à l'aide du tact, d'imprimer des livres dans lesquels ils puissent prendre des connaissances de langues, d'histoire, de géographie, de musique, etc.; d'exécuter différends travaux relatifs aux métiers.* Imprimé par les Enfants Aveugles. Paris, 1786, 4to. This celebrated essay was translated into English by Dr. Blacklock, the blind poet; and, in 1793, was published in London with his poems, in quarto. On the 26th of December, 1786, twenty-four of M. Haüy's pupils exhibited their attainments in reading, writing, arithmetic, music, and geography, before the king and the royal family at Versailles, who were delighted with the wonderful results. For a while all went on prosperously, but M. Haüy's friends soon began to give him credit for zeal rather than discretion in the management of his Institution, and consequently, as the novelty wore away, their admiration cooled, the funds fell off, and the institution languished until it was put upon a government foundation. The blind really received but little advantage from an invention that at first promised so much. The fault, however, seems to have been, not so much in the plan as in the execution of it. The books were bulky and expensive, and the letters, though beautiful to the eye, and clearly embossed, wanted that sharpness and permanence so essential to perfect tangibility; besides that, though the letters filled three spaces, they were too small to be well adapted to the sense of touch. Large editions of the few books printed were published, the idea having taken a strong hold of the public mind; so that, though the evil was soon perceived, it was not easy to abandon the defective alphabet and assume a better, for that step involved the sacrifice of all the previous labour. Hence this noble invention, except, perhaps, within the walls of the institution, soon sank into oblivion, and very little more was heard of it until 1814, when Haüy, having fallen into disrepute, was pensioned off on 2,000 francs a year, and Dr. Guillié, an active and enterprising gentleman, was made *Directeur-Général* in his place. Dr. Guillié soon revived the printing, and having considerably modified the letters, commenced the publication of a series of elementary and other works.

The mechanical execution of these volumes was exceedingly heavy. Most of them were ponderous folios, and very expensive; still they formed, for many years, almost the only literature of the blind, not alone in France, but in other countries. We should not omit particularly to mention the following book, which has come under our notice: *Notice Historique sur l'Instruction des Jeunes Aveugles.* Par M. Guillié, directeur-general de l'Institution Royale des Jeunes Aveugles de Paris. Paris, Imprimé par les Jeunes Aveugles, 1819, 4to, fifty-two pages, with seventeen lines to a page. Two leaves are pasted together, so that it is read as if embossed on both sides of a sheet. This is the second edition, the first having been embossed in 1817, the third in 1820, and a fourth edition, enlarged, in 1821. On page fifty-two is a curious specimen of printing in relief, in colour, so as to render the letters more easily read by the eye. This book was a valuable contribution to the library of the blind, but still retains nearly all the objections that were made to Haüy's first books; it can only be read by those possessing a very delicate touch. It is replete with information respecting the means then employed for the instruction of the blind in Paris; it proves, however, that the art

of embossed typography had made but very little progress. It is singular that in this book no mention is made of the author's predecessor, Haüy, to whom, we should not forget, the idea of finger-reading is due. Between the years 1821 and 1840 very little printing was done by this institution, except religious books, and music, after the system of notation by letters and ciphers. L'Institut des Jeunes Aveugles de Paris, since its foundation in 1784, has at times been in a deplorable condition, but, about the year 1840, it underwent a thorough reorganisation, and is now, under the able management of M. Dufau, justly entitled to the front rank of institutions of this class in Europe, from its usefulness, no less than its age. A radical reform in the printing department has been made: M. Dufau has devised a system of types consisting of capitals and lower-case Roman letters, and has greatly improved the character of the embossing. The French books are now well embossed, sharp, clear, and durable. They have also been so much reduced in bulk that they are offered at a moderate price. M. Dufau has proposed to print a standard library for the blind, to consist of ten volumes in quarto, for elementary instruction, and ten volumes for higher instruction. The first series is nearly completed. The second series of this library, not yet printed, it is to be hoped will soon follow. For the above lists, and other interesting information respecting the Paris typography for the blind, the jury is much indebted to a valuable pamphlet published by M. J. Guadet, entitled *L'Institut des Jeunes Aveugles de Paris, son Histoire et ses Procédés d'Enseignement*, Paris, 1850, 8vo, pp. 115. At Vienna an institution for the blind was established in 1804, but the jury is not aware of any printing having been executed in Austria before the year 1830 or 1831. About this date, the intelligent publishers, Treusinsky, of Vienna, embossed sheets with the Lord's Prayer in various languages, in Roman letters, and afterwards printed works for elementary instruction. The subject has been recently taken up by the imperial printing-office, and several volumes have been published, but the jury are unable to give a bibliographical description of them. In 1806, M. Haüy was invited to establish institutions for the blind at Berlin and St. Petersburgh. His system of instruction was adopted in each of these institutions, and the books used were, for a considerable time, supplied from the press of Paris. Both of these institutions, in a pecuniary point of view, were unsuccessful to M. Haüy, and, in 1808, he returned to Paris, and for a while resided in quiet with his brother, the celebrated Abbé Haüy. The jury have not been able to trace the progress of the printing for the blind at Berlin or St. Petersburgh, but they learn that the amount of matter embossed in Germany, until very recently, did not exceed half of the New Testament. It was in Great Britain and in the United States that the first improvements were made in embossed typography; and only within the last fifteen years, that the blind generally have derived any considerable advantages from books. Before 1826, when Mr. James Gall, of Edinburgh, first began to turn his attention to the intellectual and moral education of the blind, it is believed that not a single blind person in any public institution of this country or America could read by means of embossed characters. To Mr. Gall is due the credit of reviving this art. With the most commendable zeal, patience, and perseverance, he canvassed the form of every letter, until at length he adopted his angular alphabet. He seems, from his own *Historical Sketch of the Origin and Progress of the Literature of the Blind*, Edinburgh, 1834, 8vo, pp. 388, to have experimented long and patiently with a great variety of arbitrary and Roman alphabets, with a view of finding one sufficiently simple and tangible for finger reading. On the 28th of September, 1827, he published *A First Book for teaching the Art of Reading to the Blind;* with a short statement of the principles of the art of printing as here applied to the sense of touch. Edinburgh, published by James Gall. This is believed to be the first book printed for the blind in the English language. It is a small oblong octavo

volume, of nine pages, price sixpence, with four preliminary leaves, in which the author sets forth his "principles." The embossing is in high relief; and though it presents rather a rude appearance from the fact of its having been printed from wooden types, yet it soon rendered the practicability of reading by the blind a matter of experience in Great Britain. Mr. Gall then issued sheets printed by metallic type, which were easily read by the pupils in the asylum at Edinburgh. Encouraged by his success, in March, 1828, he issued his prospectus for the publication, by subscription, of the gospel by St. John, but it was not until about the middle of 1829 that he perfected his alphabet to his own satisfaction. He tried three different founts of type—first, the double English size; second, the double pica; and, third, the great primer; and, after printing and cancelling sheets in each of these three founts, he at length, in January, 1832, finished the printing of his great work. The blind must ever feel indebted to Mr. Gall for the zeal and honest endeavour which he displayed in accomplishing what he thought would most benefit this unfortunate class. Notwithstanding the last sheet of his work was printed in January, 1832, yet it was not till October, 1834, that he was enabled to publish it. It is entitled *The Gospel by St. John, for the Blind:* with an Introduction, containing some Historical Notices regarding the Origin of a tangible Literature for their Use. By James Gall. Edinburgh: James Gall, 24, Niddry-street. 1834. In 4to. The introduction, in common type, comprises eighteen pages. The text, in embossed characters, consists of 141 pages, with twenty-seven lines on a page of seventy square inches. The leaves are not pasted together. The subscription price of the volume was one guinea, but it was subsequently sold for six shillings. Gall was very sanguine of the entire success of his noble enterprise; and, probably, had he chosen a less angular character, and one a little more resembling our common alphabet, as he has since done, he would soon have seen his books used in every institution in the country. His alphabet was the chief objection raised to his system. His printing was clear, sharp, and permanent; and his books, in every respect, were a great improvement on Haüy's and Guillié's. He published five or six other little elementary books in 1834, at the time he issued his chief work; but his system seems not to have come into extensive use. It is to Mr. Gall, perhaps, more than to any other man, that the interest in the education of the blind was awakened throughout Great Britain and America. Nor has he allowed his exertions to flag. In 1837 he published *The Epistle of Paul the Apostle to the Ephesians,* printed for the Blind, in the largest type. The shape of the characters is similar to that in which the *Gospel of St. John* was printed, but instead of being smooth the letters are fretted or serrated. It is a small octavo volume of seventy-two pages, seventeen lines to a page; 250 copies were printed at the price of 1*s.* 6*d.* It is printed in the lower-case letters without capitals. *The Epistle to the Philippians* was also printed, in octavo, price 1*s.* 6*d.* The following year he again modified and improved his alphabet by bringing it back to a still greater resemblance to the common alphabet; but, unfortunately, he yielded to the suggestion of the Society of Arts of Edinburgh by introducing the use of capital letters at the beginning of sentences and proper names. His next book was *The Gospel according to St. Luke,* printed in the common alphabet, for the use of the blind, and capable of being read by any blind person, 1838. Printed for the British and Foreign Bible Society, London. Printed by James Gall, 22, Niddry-street, Edinburgh. This is a well-printed volume of 158 pages, twenty-eight lines on a page of seventy square inches: price 5*s.* The same year the *Acts of the Apostles* was printed in the same serrated letter, in 150 pages, price 5*s.* Besides these books, Mr. Gall printed a series of tracts for the blind, for the London Tract Society, in 1837, price 6*d.* each. It is a matter of surprise that these excellent and well-printed books of Mr. Gall are not more generally used. With the exception of the school at Abbey Hill,

near Edinburgh, it is believed they are adopted by no public institution in Great Britain. It is still a question if the roughness of the serrated character possesses any advantage over the smooth, sharp embossing. Old and used books are frequently preferred by the blind to new and fresh ones.

While Mr. Gall was thus engaged at Edinburgh, the Rev. Mr. Taylor, of York, displayed an intelligent and active interest in the education of the blind. In 1828 he published the *Diagrams of Euclid's Elements of Geometry*, in embossed or tangible form, in 8vo. This was done on Bristol board, but was found too expensive. His mode of embossing, we believe, was forcing the paper, by means of heavy pressure, into the deep cut lines of a copper-plate. It was not successful. He published also a map of England and Wales. In 1836, he printed in raised characters *Selections of Psalm Tunes and Chants*, in oblong 4to. Also a short history of Elijah the Prophet, and of Naaman the Syrian; and the History of Joseph. The efforts of Mr. Alexander Hay, in the cause of embossed typography, deserve mention, although an entire failure. He devised an alphabet of twenty-six arbitrary characters, which, by certain combinations, could represent the abbreviations and double letters; so that in all he had fifty-eight characters. He procured types and other printing apparatus, and in 1828 or 1829, issued a prospectus for publishing the *Gospel of St. Matthew*, at 7*s.* 6*d.* The book was never published. The public interest in the blind became so great, that in 1832 the Society of Arts of Edinburgh offered a gold medal of the value of £20, "for the best communication of a method of printing for the blind;" and the result was, that between the 9th of January, 1832, and the 25th of February, 1835, no less than nineteen different alphabets were submitted, of which sixteen were in a purely arbitrary character. The grand problem was to produce an alphabet that would unite cheapness and legibility. While the puzzling question of an alphabet best adapted both to the fingers of the blind and the eyes of their friends was under warm discussion on this side of the Atlantic, Dr. Howe was developing his system at Boston, in the United States. In 1833, the Perkins' Institution for the Blind was established at Boston, and Dr. S. G. Howe, a gentleman distinguished through a long series of years for his philanthropic labours, was placed at its head. As Gall had done, Dr. Howe took Haüy's invention as the basis of his system, and soon made those improvements and modifications which has rendered the Boston press so famous. He adopted the common Roman letter of the lower-case. His first aim was to compress the letter into a comparatively compact and cheap form. This he accomplished by cutting off all the flourishes and points about the letters, and reducing them to the minimum size and elevation which could be distinguished by the generality of the blind. He so managed the letters that they occupied but little more than one space and a half instead of three. A few of the circular letters were modified into angular shapes, yet preserving the original forms sufficiently to be easily read by all. So great was this reduction, that the entire New Testament, which, according to Haüy's type, would have filled nine volumes, and cost £20, could be printed in two volumes for 16*s.* Early in the summer of 1834 he published the *Acts of the Apostles*. Indeed, such rapid progress did he make in his enterprise, that by the end of 1835 he printed in relief the whole of the New Testament, for the first time in any language, in four handsome small quarto volumes, comprising 624 pages, for four dollars. These were published altogether in 1836. The alphabet thus contrived by Dr. Howe, in 1833, it appears, has never since been changed. It was immediately adopted, and subsequently became extensively and almost exclusively used by the seven principal public institutions throughout the country. It is now the only system taught or tolerated in the United States, and deserves only to be better known in Great Britain and elsewhere, to be appreciated. In America, seventeen of the states have made provision for the education of their blind; and as universal

education is the policy of the country, as well as its proudest boast, these books for the blind soon became in great demand. Dr. Howe, some time since, proposed a library for the blind; and, with a view of increasing the number of books as rapidly as possible, arrangements have been made between the several institutions and presses to exchange books with each other, and not to print any work already belonging to the library of the blind. This harmony of action, together with the uniformity of the typography, presents so many obvious advantages, that the jury cannot but wish a similar system was pursued by the institutions of Great Britain and the continent of Europe.

It appears that, exclusive of three volumes not fully described in the list, 7,903 pages, containing on an average seventy-seven square inches, have been printed at the press of the Perkins Institution, or more than twelve times the quantity of matter contained in the New Testament. Almost all the books are stereotyped, and small editions are struck off as they are required. They are sold at the actual cost, the cost of the larger works being averaged on an edition of 250 copies. The above prices include the binding; fifty per cent. discount is allowed for books sold in sheets. The books are embossed in the institution under the superintendence of Dr. Howe himself, by means of a powerful press, built for the purpose. The sale of books in 1851 amounted to 427 dollars. This, however, is exclusive of the Scriptures. The American Bible Society, which now uses the stereotype plates of the Bible described above, distributed last year 149 volumes of the Bible. In short, the Boston books possess a neatness, clearness, sharpness, and durability of impression peculiar to themselves. The seventh volume of the *Cyclopædia* is already printed, and the jury learn with pleasure that the printing of the remaining volumes will be resumed and probably be finished in twenty volumes very soon. Want of funds is the temporary and only obstacle. About the time that the Perkins Institution was established at Boston, another was set up in Philadelphia. A meeting of benevolent persons was called on the 21st of January, 1833, when arrangements were made to open a school for the instruction of the blind, and Mr. J. R. Friedlander was placed at its head. This school became the Philadelphia Institution for the Blind, by act of incorporation, 27th of January, 1834. The blind owe much to Mr. Friedlander for the Philadelphia contributions to their literature. On the 21st of November, 1833, he held the first public examination, and astonished the public by the progress of his pupils in reading, writing, geography, music, &c. The pupils read fluently from tangible letters executed by themselves with *pin types*. These were small pieces of wood about two inches long, having a letter cut in relief on one end, and the same letter formed at the other by steel points. Maps of the world and of the United States were also exhibited, made by perforating the outline from behind. The result of this exhibition was highly satisfactory. In his address, Mr. Friedlander set forth the great advantages that would accrue to the blind by a general system of instruction. He repeated the usual unanswerable arguments against the adoption of arbitrary characters, and stenographic or phonetic systems, and strongly recommended the use of our own alphabet. He followed, generally, Haüy's plan of instruction. Early in 1833, Jacob Snider, a young gentleman, a native of Philadelphia, applied his mind to the contrivance of a method of printing in relief. The alphabet at first adopted was a mixture of the upper and lower-case italics, and the relief was produced by heavy pressure on thick paper, between two sheets of copper, having the letters deeply cut. The embossing was thus on both sides. His first attempt, after printing a few elementary sheets, was on the Gospel of St. Mark, which he completed by the end of 1833, in a large quarto volume, and published early in January, 1834. An account of his first American book for the blind may be found in Poulson's *American Daily Advertiser* of the 10th of January, 1834. The four gospels were soon after printed in Roman capitals, but being found too bulky and otherwise objectionable they were aban-

doned, and a smaller, more compact, and sharper type, in the Roman capitals, was adopted.

It appears that the Boston and Philadelphia institutions were founded almost simultaneously, and that their presses and system of typography were established without being apprised of the efforts of each other. Time, however, has at length remedied this diversity. The typography of the Philadelphia books is exceedingly well executed, and compares most favourably with the best of the Glasgow books; but the press has ceased to work, and printing in capital letters will not probably be resumed. From the preference which the present distinguished and intelligent director of the Philadelphia Institution, Mr. William Chapin, late superintendent of the Ohio Institution, is known to entertain for the Boston system of typography, we may reasonably hope that, when printing shall be resumed there, it will be with Howe's alphabet. It is the opinion, however, of Mr. Chapin, that all the American institutions should unite, not only in the use of the same alphabet, but that they should all contribute to support one press. It may be remarked here, that the pupils in all the American institutions read fluently in both the upper and lower-case letters, but it is presumed that Philadelphia and Glasgow books will soon be entirely abandoned there; and, as the Boston books can now be obtained in London at a price cheaper than any of the five different systems of books printed in Great Britain, it is to be hoped that they will come into general use here. If it be thought that the letters are too small for adults to read with ease, books may be printed with larger types, and even then be less bulky and expensive than any of the systems in arbitrary characters now in use. In the year 1848 or 1849, the Virginia Institution set up a press, and has since printed several elementary and school books. The Boston type is adopted, with the exception that capitals are used at the beginning of sentences and proper names. This alteration, in the opinion of the jury, is not an improvement, as the blind are thus compelled to learn two alphabets instead of one. The Virginia books are well embossed, and it is hoped that in future books capitals will be omitted. To the American Bible Society at New York much praise is due for their commendable efforts in the circulation of the Scriptures among the blind. The stereotype plates of the Bible in six volumes, executed at the Boston press, under the superintendence of Dr. Howe, now belong to this society. They have printed a second edition from the same plates, and annually distribute, gratuitously, from 100 to 300 volumes. It had ceased to be a matter of surprise in the United States that the blind could read, before the public attention was loudly called to the subject in Great Britain; for we see that, in 1836, there were two active printing establishments for the blind in the United States; by one, the whole of the New Testament had been published in a cheap form, in the common lower-case letters; and by the other the four Gospels in Roman capitals. Let us now return to the Society of Arts of Edinburgh, and their prize medal, to which we have already referred. It was not until the 31st of May, 1837, that the society's medal was awarded. In 1836, when the nineteen different alphabets were before the committee of the society, circulars were drawn up and distributed, with specimens of the several alphabets, to the various institutions for the blind in England and Scotland, and every means employed to arrive at a correct result. The opinions of Mr. Taylor, of York, and Mr. Alston, of Glasgow, seem to have been those which the society chiefly followed. They were in favour of the common Roman capital letter, merely deprived of the seruphs, or small strokes at their extremities, and, accordingly, the prize was awarded to Dr. Fry, of London; and on the 31st of May, 1837, a medal was granted to him for the invention of an alphabet which appears to have been in use, since 1833, in Philadelphia.

On receiving the society's circular, in 1836, submitting the forms of all the competing alphabets to him, Mr. Alston was struck with the simplicity of Fry's, and immediately

conceived the idea of making such alterations as he thought necessary, and putting it to the test. The changes made were simply to reduce the size of the letters and render the faces thinner. On the 26th of October, 1836, he exhibited his first specimen of printing in relief in the Roman capital letter at a public examination of the blind. It was Fry's alphabet, slightly changed to improve the sharpness of the embossing. He then made a successful appeal for a printing fund. After great exertions and most commendable perseverance, he procured a printing press, with two founts of type, and the other necessary printing apparatus. In January, 1837, he issued a few elementary works. By March, 1838, he had made such progress, that the whole of the New Testament was printed in four super-royal quarto volumes; the type is great primer; and there are, in the four volumes, 623 leaves, of forty-two lines to a page. In December, 1840, Mr. Alston completed the printing of the Old Testament in fifteen super-royal quarto volumes, in double pica type. Of nine of the volumes he printed 200, and of the remaining six, 250 copies. There are in all these fifteen volumes, 2,505 pages, with thirty-seven lines on a page. Mr. Alston was justly proud of his great work, the entire Bible, containing the Old and New Testaments, in nineteen volumes. In his *Statement of the Education, Employment, and Internal Arrangements adopted at the Asylum for the Blind, Glasgow; with a short Account of its Founder, &c.*, tenth edition, 1846, 8vo, p. 80, he says, "this is the first bible ever printed for the blind;" but in this he was evidently in error, as we have shown that the greater part of it had long before been printed in Boston. We allude to these facts, merely because it seems a matter of much regret that Mr. Alston should have devoted so much enterprise and money in producing the Scriptures, when he might have ascertained that they had already been printed, and could have been bought at less money than it would cost him to print them. The main difference between the Glasgow and the Boston alphabets is, that one is in the upper and the other is in the lower case, which difference is certainly not of sufficient consequence to demand two editions. Had he expended the same energy and money in producing other valuable works, and exchanged them with the Boston and Philadelphia Institutions, as he was urged to do, the three institutions would have been greatly benefited by the large outlay, and the blind of both countries would have had a great increase to their library. On the 18th of January, 1838, the officers of the Philadelphia Institution wrote to Mr. Alston, informing him that they possessed a printing press, and "understanding that you adopt the same character, it appears to our board of management that both institutions would gain by an interchange of volumes." Mr. Alston at once acceded to this proposition, and immediately shipped 150 volumes, being ten full sets of the New Testament, and fifty single copies of the gospels, besides multiplication tables and other works.

Since the death of Mr. Alston, on the 20th of August, 1846, the Glasgow press has almost ceased to work. A few of the volumes have been reprinted. It is at present engaged in reprinting the *Gospel of St. John* and the *Acts of the Apostles*. Since 1837, it has been almost the only press that has supplied England, Ireland, and Scotland with embossed books in Roman type. These books are typographically well executed, and the jury think Mr. Alston and the Glasgow press are deserving of great praise. The objections, however, to the small Roman capitals, in which most of the books are printed, are such that it is to be hoped that ere long this press will follow the example of that at Philadelphia, and adopt Howe's typography. It has generally been supposed that the Glasgow press was the only one in Great Britain that printed anything of consequence in the common letter. But we cannot omit to mention a valuable work that has come under our notice; it is a *Magazine for the Blind*. London; Simpkin, Marshall and Co., Stationers'-court; price 6*s.*; in twelve monthly parts. 1839-40. After two volumes were printed, the first magazine for the blind in this country was discontinued. It is in

quarto form, and has twenty-three lines on a full page. The type is the ordinary mixture of the upper and lower-case of Roman letter, and the work is beautifully printed. The first volume contains seventy-eight pages, and the second seventy-three. It is to be regretted that so valuable a contribution to the literature of the blind should not have found better support. It consists of miscellaneous information, with fragments of authors, poetry, anecdotes, woodcuts, &c. In 1806, an institution for the blind was established at Stockholm, and it is with pleasure that we learn that Mr. Watts, of Crown-court, London, has, at the expense of the British and Foreign Bible Society, printed in relief, with the ordinary Roman type, in capitals and lower-case, the *Gospel according to St. Luke*, in Swedish, for this institution. The volume was printed in 1848, and is a beautiful specimen of embossed typography. It is in quarto, consisting of 132 pages, twenty-seven lines on a page of seventy square inches. Price, as sold by the Bible Society, at cost, 6*s.*; 500 copies were printed.

In France, Belgium, Prussia, Austria, Switzerland, Sweden, and the United States, the Roman lower-case alphabet is used. In most, if not all, of these countries, the institutions for the blind are supported and partially controlled by government, and perhaps this is the reason why, in all of them nearly, the same system of typography prevails. In Great Britain, however, the case is different. There are now five entirely different systems of typography in use here, and vigorously pressed upon the benevolent public. The unfortunate blind are thus deprived of the advantages they might have, if harmony of action and uniformity of typography were adopted. This diversity of opinion is causing great injustice to them, and the jury cannot but urge upon the parties concerned the speedy adoption of some one system throughout the country. Our opinion is decidedly in favour of Howe's American typography. Perfection is not claimed for this system, but it seems to us that there are fewer objections to it than to any of the others, and it may be the more easily improved; but any one of the five principal systems now used in England is far better than so many. The present state of printing in the Roman character in Great Britain, is, as we have seen already, that every press has been stopped, while the books in arbitrary characters seem to be increasing and gaining public favour. The principal of these is one known as Lucas's. It was devised by T. M. Lucas, of Bristol, about the year 1835. It consists of arbitrary characters, and is said to be founded on Byron's system of stenography. It is simple, speedily learned, and easily read by the touch, and is generally acknowledged to be, of all the arbitrary systems, the best. The printing on this system began at Bristol, and the following are the works published there:—1. *The Gospel according to St. John*, edited by T. M. Lucas, inventor of the system for teaching the blind to read by embossed stenographic character; July, 1837; Bristol: in 4to, sixty-six pages, and twenty-seven lines to a page. Two pages are pasted together.—*2. The Acts of the Apostles* (according to the authorised version), in T. M. Lucas's embossed stenographic character; 1838. Published under the direction of the Bristol Society for Embossing and Circulating the Authorised Version of the Bible for the use of the Blind; Bristol; in 4to, 118 pages, twenty-seven lines on a page.—(This second publication of Mr. Lucas was announced as containing some improvements: as widening the spaces and lessening the abbreviations.)—3. *The Gospel according to St. Matthew* (according to the authorised version), in T. M. Lucas's embossed stenographic character, 1839; published, &c.; Bristol; 4to, 116 pages.—(In this third publication is announced the firm conviction that this system will prevail over any other plan, on account of its tangibility.)—4. *The Gospel according to St. Mark*, &c.; Bristol, 1840; 4to, seventy-one pages. The above, with the exception of a few small elementary works, are, we believe, all that appeared at Bristol. In the year 1839, a society was formed, called "The London Society for Teaching the Blind to Read." They adopted Lucas's

system, and have been gradually improving it. The following year the types and printing apparatus were transferred from Bristol to London; and in 1841 the society issued *The Epistle to the Romans.* Since then their press has not been idle, and the printing is now done by the blind at the institution in the Avenue-road, Regent's-park.

In May, 1838, the "London and Blackheath Association for Embossing the Scriptures in various languages, and for Teaching the Blind to Read on the Phonetic System," was established. Its object is to stereotype the Holy Scriptures in James Hartley Frere's phonetic characters. About the year 1839, Mr. Frere devised a cheap plan for embossing or stereotyping. It consists simply of small wires, drawn with angles, laid down upon tin plates. The wires are bent, and cut by means of ingenious spindles to form the characters, which are similar to those of Gurney's system of short-hand. The wires are attached to the plate by heating it sufficiently to melt the coating of tin, into which the wire sinks, and is fast when cold. The common printing press is used in embossing. Mr. Frere's books are read from left to right and back, after the manner of the ancient Greek boustrophedon writing. Mr. Frere's books are well embossed, and from his plates the books can be printed as they are wanted. The objections to phonetic alphabets are obvious. Mr. Frere, however, does not claim to supersede the common spelling, or the common printing, or common embossing, but to form an easy introduction to them. More recently still, another system has been devised by Mr. W. Moon, master of the Brighton Blind Asylum. The characters are arbitrary, though Mr. Moon defines them as the "Common Alphabet Simplified." He claims also a new mode of stereotyping, by which the characters are rendered sharp and prominent. The lines are read forwards and back like Frere's plan, and it is even more bulky and expensive than his. The new mode of stereotyping is believed to be quite the same as Frere's, by means of wires laid on tin plates.

CHAPTER XVI.

ADDITIONAL REMARKS UPON PRINCE ALBERT'S MODEL HOUSES—ESTIMATE OF THEIR COST—ORIGINAL IDEA OF THE GREAT EXHIBITION BY PRINCE ALBERT—THE PRINCE'S REPLY TO THE REPORT OF LORD CANNING.—BENNETT'S DESIGN FOR A NATIONAL MONUMENT TO PRINCE ALBERT.

We have already in an earlier part of this work noticed at some length Prince Albert's Model Houses. The building was designed and practically superintended by Mr. Roberts, the honorary architect to the excellent "Society for Improving the Condition of the Working Classes," the president, Prince Albert, having supplied the means, and obtained the advantageous site on which it stood. The following additional particulars are from those drawn up by the architect:—"In its general arrangement the building is adapted for the occupation of four families of the class of manufacturing and mechanical operatives, who usually reside in towns, or in their immediate vicinity; and as the value of land, which leads to the economising of space, by the placing of more than one family under the same roof, in some cases, renders the addition of a third, and even of a fourth story desirable, the plan has been suited to such an arrangement, without any other alteration than the requisite increase in the strength of the walls. The most prominent peculiarity of the design is that of the receding and protected central open staircase, with the connecting gallery on the first floor, formed of slate, and sheltered

from the weather by the continuation of the main roof, which also screens the entrances to the dwellings. The four tenements are arranged on precisely the same plan, two on each floor. The entrance is through a small lobby, lighted from the upper part of the door. The living room has a superficial area of about 150 feet, with a closet on one side of the fire-place, to which warm air may be introduced from the back of the range; over the fire-place is an iron rod for hanging pictures; and on the opposite side of the room a shelf is carried above the doors, with a rail fixed between them. The scullery is fitted up with a sink, beneath which is a coal-bin of slate; a plate-rack at one end, drained by a slate slab into the sink, covers the entrance to the dust-shaft, which is inclosed by a balanced self-acting iron door. The dust-shaft leads into a closed depository under the stairs, and has a ventilating flue, carried up above the roof. The meat-safe is ventilated through the hollow brickwork, and shelves are fixed over the doors. A dresser-flap may be fixed against the partition. The sleeping apartments, being three in number, provide for that separation which, with a family, is so essential to morality and decency. Each has its distinct access, and a window into the open air; two have fireplaces. The children's bed-rooms contain 50 feet superficial each, and, opening out of the living room, an opportunity is afforded for the exercise of parental watchfulness, without the unwholesome crowding of the living room, by its use as a sleeping apartment. The parents' bed-room, with a superficial area of about 100 feet, is entered through the scullery—an arrangement in many respects preferable to a direct approach from the living room, particularly in cases of sickness. The recess in this room provides a closet for linen; and a shelf is carried over the door, with a rail fixed beneath it—a provision which is made in each of the other bed-rooms. The water-closet is fitted up with a Staffordshire glazed basin, which is complete without any wood fittings, and supplied with water from a slate cistern, in common, of 160 gallons, placed on the roof over the party and staircase walls. The same pipes which carry away the rainwater from the roof serve for the use of the closets."

With reference to the cost of construction, the following statement is made:—"In most parts of England the cost of four houses, built on the plan of this model structure, with ordinary materials, and finished similar to the ground floor apartments, may be stated at £440 to £480, or from £110 to £120 for each tenement, contingent on the facilities for obtaining materials and the value of labour. Such dwellings, let at 3*s*. 6*d*. to 4*s*. a-week, would, after deducting ground-rent and taxes, afford a return of seven per cent. on the amount of outlay. Where hollow bricks are obtainable at a fair price, their use ought to effect a reduction of about 25 per cent. on the cost of the brickwork; or equal on these four houses to about £40." It is difficult to over-estimate the magnitude and importance of the effects of such a change as would be induced upon the population of the country, by the introduction of such dwellings as these for the poorer classes of the community; whether as adding to their individual happiness, or improving their physical and moral condition, and thus rendering them more valuable and useful members of society. The jury unanimously recommended to the council that they should award the medal reserved to their gift to His Royal Highness Prince Albert, as the exhibitor of this most useful and interesting contribution to the exhibition, and to whom the nation at large is so deeply indebted for the promotion of this important subject. The claims of the prince to the original idea of collecting under one roof examples of the varied industry and talent of the whole world are so fully admitted that we need not advance them anew to our readers. In addition, however, to what we have already laid before them, numerous examples might be adduced of the interest taken by his Royal Highness with respect to the success of the Exhibition, which display with what unwearied zeal he constantly endeavoured to promote its advancement. A variety of objects of art, as well as of

agricultural produce, were contributed by His Royal Highness, several of which received the award of prize medals, in testimony of the approbation of the jury. Many eloquent addresses were also delivered, on various occasions, by the accomplished prince, in furtherance of the views of the Great Exhibition. The testimony of His Royal Highness in favour of the support which had been afforded by foreign countries to our great national undertaking, is in particular so well expressed, and contains so many true and beautiful sentiments, that we feel justified in laying it before our readers; and we shall accordingly transcribe it from the speech of His Royal Highness, in reply to the report of Lord Canning, on presenting the awards of the juries to the royal commission.

"It now becomes my pleasing duty," observed His Royal Highness, "on behalf of the royal commissioners, to deliver my most sincere acknowledgments and thanks for the hearty co-operation and support which the Exhibition has constantly received from foreign countries. The foreign commissioners who have left their own countries to superintend the illustration of their respective national industries at the Exhibition, have ever shown that desire to aid the general arrangements which alone has rendered possible the success of the undertaking. To the Society of Arts, which by its exhibitions of works of national industry prepared the way for this international Exhibition, the royal commission and the public feel that their acknowledgments are specially due, and the commission have to thank that body for having carried out the preliminary arrangements to an extent which justified me, as their president, in the application which I made to the crown for the issue of a royal commission. The commission have also to acknowledge the valuable services afforded by the eminent, scientific, and professional men, who, on the sectional committees, aided most materially in founding a scientific basis on which to rear the Exhibition. To the local commissioners and members of local committees, but more especially to those who have undertaken the onerous duties of secretaries, our best acknowledgments are also due. Without their zealous aid it would have been impossible to have obtained an efficient representation of the industrial products of their respective localities. And finally, we cannot forget that all the labours of those thus officially connected with the Exhibition would have been in vain, had it not been for the hearty good-will and assistance of the whole body of exhibitors, both foreign and British. The zeal which they have displayed in affording a worthy illustration of the state of the industry of the nations to which they belong, can only be equalled by the successful efforts of their industrial skill. The commission have always had support and encouragement from them during the progress of the undertaking, and they cannot forget how cheerfully they submitted to regulations essential for their general good, although sometimes producing personal inconvenience to themselves. If the Exhibition be successful in aiding the healthy progress of manufactures, we trust that their efforts will meet with a due reward.

"In now taking leave of all those who have so materially aided us in their respective characters of jurors and associates, foreign and local commissioners, members and secretaries of local and sectional committees, members of the Society of Arts, and exhibitors, I cannot refrain from remarking, with heartfelt pleasure, the singular harmony which has prevailed amongst the eminent men representing so many national interests—a harmony which cannot end with the event which produced it. Let us receive it as an auspicious omen for the future; and while we return our humble and hearty thanks to Almighty God for the blessing he has vouchsafed to our labours, let us all earnestly pray that Divine Providence, which has so benignantly watched over and shielded this illustration of nature's productions, conceived by human intellect, and fashioned by human skill, may still protect us, and may grant that the interchange of knowledge, resulting from the meeting of enlightened people in friendly rivalry, may be dispersed far and wide

over distant lands; and thus, by showing our mutual dependence upon each other, be a happy means of promoting unity among nations, and peace and good will among the various races of mankind.—ALBERT."

We may here be allowed to observe, in testimony of the high estimation in which the oratorical talent of His Royal Highness is held, the fact that his celebrated speech at the Mansion-house dinner was translated into several European and Oriental languages, and exhibited, among other specimens of fine printing, in the department appropriated to similar works in the Crystal Palace. In further evidence of the valuable nature of the services rendered by the Prince to the Great National Undertaking, we may quote the following passage from the juries' reports; and we trust that the wish therein expressed, that a statue of His Royal Highness should be erected on the site of the late building, in lasting token of the grateful acknowledgment of the nation, should at no very distant period be realised.

"The Jury of Class XXX.," says our learned reporter, "having brought their labours to a conclusion, cannot refrain from expressing their hope that steps may be taken for rendering the Great Exhibition as useful now it has ceased to be, as it has proved gratifying and instructive in the course of its short existence. It is the wish to see these hopes realized, that impels the jury, even at the risk of overstepping the strict limits of their functions, to submit, with great deference, their views on this point to the royal commissioners. The foundation of a permanent industrial museum in the heart of the metropolis of trade and industry, seems to the jury the logical and practical consequence of this Exhibition. It is in the Crystal Palace that the great truth has been impressed upon us, that art and taste are henceforth to be considered as elements of industry and trade—of scarcely less importance than the most powerful machinery. It seems also natural that this museum should, in the first instance, consist of the objects to which the several juries have called public attention as happy types and models for imitation. While such a museum, on the one hand, would be a lasting depository of industry and of the arts; it would, on the other, serve as the best and easiest standard of comparison by which human ingenuity might mark its progress, on the opening, ten years hence, of a new Great Exhibition; it would serve alike as a guide and as a beacon. Thus the Great Exhibition of 1851, which already stands out so prominently in the past, would bear fruitful and lasting consequences for the future, and would acquire an additional claim to a grateful record in the annals of mankind. The Greeks, our masters in the nobler arts, did not trust to the historian and the poet alone for the record of their achievements, but committed to the greatest artists the task of immortalising their military triumphs. The Great Exhibition deserves to be celebrated as the triumph of industry and invention over commercial routine and international jealousies. Whether the Crystal Palace shall be removed or not, posterity will look for some mark of gratitude to the illustrious prince to whom the present generation owe the realisation of a gigantic thought; a thought which may have floated in the minds of others, but which received consistency, and was brought to maturity by his energy and perseverance. The Jury of Class XXX., therefore, hope that on the site of the Exhibition Building a statue will be erected to Prince Albert. On its base should be recorded the share which statesmen and others have borne in bringing such an undertaking to completion. The Fine Arts would thus be called upon to perpetuate the memory of the Great Exhibition, to the attractions of which they have so variously and so powerfully contributed."

In anticipation of the foregoing wish, a design for a National Monument to Prince Albert was exhibited by Bennett, in the Fine Arts' Court. The design was square in plan. On the four sides were four large panel castings in relief, to commemorate the Industrial Exhibition of 1851, and the chief events connected therewith. The first repre-

sented the exterior of the Exhibition; the second, its interior; the third, the grand opening to all nations; and the fourth, the distribution of prizes. These compartments were intended to be twice the size of those on the base of the Nelson column in Trafalgar-square, and to have sculptured figures in niches, on either side, to give the subjects of the castings in an emblematic sense, showing the noble intention of His Royal Highness relative to each; and at the extreme angles of the base, carried out as abutments, were sculptured blocks, upon which were illustrated the emblems of royalty and peace. Europe, Asia, Africa, and America, as emblematic figures, were seated at the four angles of the base; above which the globe of the earth was represented in polished granite, on which was placed a marble statue of the prince, in a metal temple, gilt, and dedicated to Prosperity and Fame, with the crown of England above, to denote the royal auspices under which the Great Exhibition had been so successfully accomplished.

CHAPTER XVII.

THE GENERAL BEARING OF THE GREAT EXHIBITION ON THE PROGRESS OF ART AND SCIENCE.

PROFESSOR WHEWELL—CRITICISM AFTER POETRY—POETRY OF THE GREAT EXHIBITION—OBJECT OF CRITICISM—DIFFERENCE BETWEEN THE ARTS IN ORIENTAL AND EUROPEAN COUNTRIES—CLASSIFICATION, ETC., ETC.

We extract the following able remarks from the Inaugural Lecture, delivered by the learned and philosophic Dr. Whewell, at the request of the Council of the Society of Arts, on "The general bearing of the Great Exhibition on the progress of Art and Science."

"It seems to me," observes the modest, though talented lecturer, "as if I were one of the persons who have the least right of any to address an audience like this on the subject of the Great Exhibition of the Art and Industry of All Nations, of which the doors have so lately closed; inasmuch as I have had no connexion with that great event, nor relation to it, except that of a mere spectator—one of the many millions there. The eminent and zealous men in whose wide views it originated, by whose indomitable energy and perseverance the great thought of such a spectacle was embodied in a visible, material shape; those who, from our own countries or from foreign lands, supplied it with the treasures and wonders of art; those who, with scrutinizing eye and judicial mind, compared those treasures and those wonders, and stamped their approval on the worthiest; those who can point to the glories of the Exhibition, and say, *quorum pars magna fui*;—those persons may well be considered as having a right to express to you the thoughts which have been suggested by the scenes in which they have thus had to live; but of these, I am not one. I have been in the Exhibition, as I have said, a mere spectator. Nevertheless, the Council of the Society of Arts have done me the honour to express a wish that I should offer to you such reflections as the spectacle of the Great Exhibition has suggested to me; and, in deference to their wishes, and especially as a token of my admiration of the truly royal mind, which saw clearly, in despite of the maxims of antiquity, that there *was* such a royal road to knowledge, I shall venture to offer you a few remarks—which, precisely on account of the circumstances I have stated, may be considered as representing the views of an unconnected spectator of the great spectacle.

To write or speak the epilogue after any great and grand drama, is by no means an easy task. We see the confession of the difficulty in the very incongruity of the manner in which the task is sometimes attempted: as when, after the curtain has fallen upon a deep and solemn tragedy, some startling attempt at wit and pleasantry is uttered to the audience; it may be by one of the characters whose deep sorrows or lofty aims we have been following with the profoundest interest. You will, at least, on the present occasion, not have the difficulty of the task shown *in this manner*. Nor, indeed, is it my office, in any sense, to speak an epilogue at all. Perhaps such remarks as I have to make may rather be likened to the criticism which comes after the drama. For, as you know, criticism does come after poetry; the age of criticism after the age of poetry; Aristotle after Sophocles, Longinus after Homer. And the reason of this has been well pointed out in our time; that words, that human language, appear in the form in which the poet utters them and works with them for his purposes, before they appear in the form in which the critic must use them: language is picturesque and affecting first; it is philosophical and critical afterwards: it is first concrete, then abstract: it acts first, it analyses afterwards. And this is the case, not with words only, but with works also. The *poet*, as the Greeks called him, was the *maker*, as our English fathers, also, were wont to call him. And man's power of making may show itself not only in the beautiful texture of language, the grand *machinery* of the epic, the sublime display of poetical *imagery*, but in those material works which supply the originals from which are taken the derivative terms which I have just been compelled to use: in the textures of soft wool, or fine linen, or glossy silk, where the fancy disports itself in wreaths of visible flowers; in the machinery, mighty as the thunderbolt, to rend the oak—or light as the breath of air which carries the flower-dust to its appointed place; in the images which express to the eye beauty and dignity, as the poet's verse does to the mind; so that it is difficult to say whether Homer or Phidias be more truly a poet. That mighty building, then, along the aisles of which we have wandered day after day in past months, full as it was of the works of man, contained also the works of many who were truly *makers;* who stamped upon matter and the combinations of matter, that significance and efficacy which makes it a true exponent of the inward activity of man. The objects there, the symbols, instruments and manifestations of beauty and power, were utterances,—articulate utterances of the human mind, no less than if they had been audible words and melodious sentences. There were expressed in the ranks of that great display many beautiful and many powerful thoughts of gifted men of our own and of other lands. The Crystal Palace was the cabinet in which were contained a vast multitude of compositions—not of words but of things, which we, who wandered along its corridors and galleries might con, day by day, so as to possess ourselves in some measure, and according to our ability, of their meaning, power, and spirit. And now, that season of the perusal of such a collection of works being past; those days of wonderment at the creations of such a poetry being gone by; the office of reading and enjoying being over; the time for criticism seems to have arrived. We must now consider what it is that we have admired, and why; must try to analyse the works which we have thus gazed upon and to discover the principles of their excellence. As the critic of literary art endeavours to discern the laws of man's nature, by which he can produce that which is beautiful and powerful, operating through the medium of language; so the critic of such art as we have had here presented to us—of *material* art, as we may term it—endeavours to discern the laws of material nature; to learn how man can act by these, operating through the medium of matter, and thus produce beauty, and utility, and power. This kind of criticism appears to be the natural and proper sequel to such a great burst of production and exhibition as we have had to witness; to discover what

the laws of operative power are, after having had so great a manifestation of what they do."

After an able exposition of the nature of these laws, the learned lecturer proceeds to descant on the "great and unique" opportunity we have had in the grand display of our late Exhibition, of taking a survey, at a glance, as it were, of the state of art in every part of the world. To have inspected all these treasures in the various countries from whence they were drawn, would have been the work of a life, and of a long and laborious one; and would moreover have required the most felicitous combination of opportunity, wealth, and power. Whereas, as if by the magic influence of some fairy wand, the whole glorious spectacle has been presented to the wondering eyes of assembled multitudes in its crystal bounds; in the magic palace that, indeed, rose like an exhalation before their charmed sight. We had there collected examples of the food and clothing, and other works of art of nations in every stage of the progress of art. From Otaheite, so long in the eyes of Englishmen the type of gentle but uncultured life, queen Pomare sent mats and cloth, head-dresses and female gear, which the native art of her women fabricates from their indigenous plants. From Labuan, we had clothes and armour, weapons and musical instruments. From our wide Indian empire we had a profusion of contributions; from Singapore and Ceylon, Celebes and Java, Mengatal and Palembang. From Sumatra the loom, the plough, lacquered-work and silken wares; and from Central and Ancient India innumerable treasures of skill and ingenuity, of magnificence and beauty.

"And yet," continues Dr. Whewell, "we perceive that, in advancing from these to the productions of our own form of civilisation, which has even in that country, shown its greater power, we advance also to a more skilful, powerful, comprehensive, and progressive form of art. And looking at the whole of this spectacle of the arts of life in all their successive stages, there is one train of reflection which cannot fail, I think, to strike us; viz., this:—In the first place, that man is by nature and universally, an artificer, an artizan, an artist. We call the nations from which such specimens came as those which I first mentioned, rude and savage, and yet how much is there of ingenuity, of invention, of practical knowledge of the properties of branch and leaf, of vegetable texture and fibre, in the works of the rudest tribes! How much, again, of manual dexterity, acquired by long and persevering practice, and even so, not easy! And then, again, not only how well adapted are these works of art to the mere needs of life, but how much of neatness, of prettiness, even of beauty, do they often possess, even when the work of savage hands! So that man is naturally, as I have said, not only an artificer, but an artist. Even we, while we look down from our lofty summit of civilized and mechanically-aided skill upon the infancy of art, may often learn from them lessons of taste. So wonderfully and effectually has providence planted in man the impulse which urges him on to his destination,—which is, to mould the bounty of nature into such forms as utility demands, and to show at every step that with mere utility he cannot be content. And when we come to the higher stages of cultured art—to the works of nations long civilized, though inferior to ourselves, it may be, in progressive civilization and mechanical power, how much do we find in their works which we must admire; which we might envy; which, indeed might drive us to despair! Even still, the tissues and ornamented works of Persia and of India have beauties which we, with all our appliances and means, cannot surpass. The gorgeous East showers its barbaric pearl and gold into its magnificent textures. But is there really anything *barbaric* in the skill and taste which they display? Does the Oriental prince or monarch, even if he confine his magnificence to native manufactures, present himself to the eyes of his slaves in a less splendid or less elegant attire than the nobles and the sovereigns of this our

western world—more highly civilized as we nevertheless deem it? Few persons, I think, would answer in the affirmative. The silks and shawls, the embroidery and jewellery, the moulding and carving which those countries can produce, and which decorate their palaces and their dwellers in palaces, are even now such as we cannot excel. *Oriental* magnificence is still a proverbial mode of describing a degree of splendour and artistical richness which is not found among ourselves."

The learned master of Trinity then proceeds to describe the difference between the arts of "nations rich, but in a condition of nearly stationary civilization, like Oriental nations, and nations which have felt the full influence of progress like ourselves." "If I am not mistaken," says he, "the difference may be briefly expressed thus:—that in those countries the arts are mainly exercised to gratify the tastes of the few; with us to supply the wants of the many. There, the wealth of a province is absorbed in the dress of a mighty warrior; here, the gigantic weapons of the peaceful potentate are used to provide clothing for the world. For that which makes it suitable that machinery, constructed on a vast scale, and embodying enormous capital, should be used in manufacture, is that the wares produced should be very great in quantity; so that the smallest advantage in the power of working, being multiplied a million-fold, shall turn the scale of profit. And thus such machinery is applied when wares are manufactured for a vast population; —when millions upon millions have to be clothed, or fed, or ornamented, or pleased with the things so produced. This, therefore, is the meaning of the vast and astonishing prevalence of machine-work in this country: that the machine with its million fingers works for millions of purchasers; while, in remote countries, where magnificence and savagery stand side by side, tens of thousands work for one. There art labours for the rich alone; here she works for the poor no less. There the multitude produce only to give splendour and grace to the despot or the warrior, whose slaves they are, and whom they enrich; here the man who is powerful in the weapons of peace, capital and machinery, uses them to give comfort and enjoyment to the public, whose servant he is, and thus becomes rich while he enriches others with his goods. If this be truly the relation between the condition of the arts of life in this country and in those of others, may we not with reason and with gratitude say, that we have indeed, reached a point beyond theirs in the social progress of nations?"

The learned lecturer then proceeds to the subject of classification, and after shewing the errors and deficiencies in classifying in the French *Exposition* of 1806, and the gradual improvement that took place in the succeeding ones till the year 1849, bestows great commendation upon the system that was adopted in the Great Exhibition of 1851, the superior advantages of which he very clearly points out. "I do not think," says he, "there is any presumption in claiming, for the classification which has been adopted in the Great Exhibition of 1851, a more satisfactory character than we can allow for any of those just mentioned, if we ground our opinion either upon the way in which this last classification was constructed, or upon the manner in which it has been found to work. And there is one leading feature in it, which, simple as it may seem, at once gives it a new recommendation. In the systems already mentioned there were no *gradations* of classification. There were a certain number, thirty-nine, or five, nine or eight, of co-ordinate classes, and that was all. In the arrangements of the Great Exhibition of 1851, by a just and happy thought, a division was adopted of the subjects to be exhibited into four great *Sections*, to which other classes, afterwards established, were to be subordinate; these sections being, *Raw Materials, Machinery, Manufactured Goods, and the works of the Fine Arts.* The effect of this grand division was highly beneficial, for, within each of these sections, classes could be formed, far more homogenous than was possible while these sections were all thrown into one mass: when, for instance,

the cotton-tree, the loom, and the muslin, stood side by side, as belonging to *vestiary* art; or when woven or dyed goods were far removed, as being examples, the former of *mechanical*, the latter of *chemical* processes. Suitable gradation is the *felicity* of the classifying art, and so it was found to be in this instance." We are next favoured with an able discussion upon the immense advantage that will accrue to the world of science and of art, from the introduction of a coherent, sound, and graduated classification, such as was, in fact, adopted in the Great Exhibition; to the formation of which, we are assured in the *Illustrated Catalogue*, "eminent men of science, and of manufactures in all branches, were invited to assist in drawing each one the boundaries of his own special class of productions." And it was resolved, for the general purposes of the Exhibition, to adopt thirty broad divisions; of which classes, four were of Raw Materials; six of Machinery; nineteen of Manufactures; and one of the Fine Arts.

"There is yet," continues our eloquent lecturer, "one other remark which I should wish to make, suggested by the classification of the objects of the Exhibition; or, rather, a remark which it is possible to express, only because we have such a classification before us. It is an important character of a right classification, that it makes general propositions possible; a maxim which we may safely regard as well grounded, since it has been delivered independently by two persons, no less different from one another than Cuvier and Jeremy Bentham. Now, in accordance with this maxim, I would remark, that there are general reflections appropriate to several of the divisions into which the Exhibition is by its classification distributed. For example: let us compare the first class, *Mining and Mineral Products*, with the second class, *Chemical Processes and Products*. In looking at these two classes, we may see some remarkable contrasts between them. The first class of arts, those which are employed in obtaining and working the metals, are among the most ancient; the second, the arts of manufacturing chemical products on a large scale, are among the most modern which exist. In the former class, as I have said, Art existed before Science; men could shape, and melt, and purify, and combine the metals for their practical purposes, before they knew anything of the chemistry of metals; before they knew that to purify them was to expel oxygen or sulphur; that combination may be definite or indefinite. Tubal-Cain, in the first ages of the world, was 'the instructor of every artificer in brass and iron;' but it was very long before there came an instructor to teach what was the philosophical import of the artificer's practices. In this case, as I have already said, art preceded science: if even now science has overtaken art; if even now science can tell us why the Swedish steel is still unmatched, or to what peculiar composition the Toledo blade owes its fine temper, which allows it to coil itself up in its sheath when its rigid thrust is not needed. Here art has preceded science, and science has barely overtaken art. But in the second class, science has not only overtaken art, but is the whole foundation, the entire creator of the art. Here art is the daughter of science. The great chemical manufactories which have sprung up at Liverpool, at Newcastle, at Glasgow, owe their existence entirely to a profound and scientific knowledge of chemistry. These arts never could have existed if there had not been a science of chemistry; and that, an exact and philosophical science. These manufactories are now on a scale at least equal to the largest establishments which exist among the successors of Tubal-Cain. They occupy spaces not smaller than that great building, in which the productions of all the arts of the world were gathered, and where we so often wandered till our feet were weary. They employ, some of them, five or six large steam-engines; they shoot up the obelisks which convey away their smoke and fumes to the height of the highest steeples in the world; they occupy a population equal to that of a town, whose streets gather round the walls of the mighty work-shop. Yet these processes are all derived from the

chemical theories of the last and the present century; from the investigations carried on in the laboratories of Scheele and Kirwan, Berthollet and Lavoisieur. So rapidly in this case has the tree of art blossomed from the root of science; upon so gigantic a scale have the truths of science been embodied in the domain of art.

Again, there is another remark which we may make in comparing the first class, *Minerals,* with the third class; or rather with the fourth, *Vegetable and Animal substances used in Manufactures, or as implements or ornaments.* And I wish to speak especially of *vegetable* substances. In the class of *Minerals,* all the great members of the class are still what they were in ancient times. No doubt a number of new metals and mineral substances have been discovered; and these have their use; and of these the Exhibition presented fine examples. But still, their use is upon a small scale. Gold and iron, at the present day, as in ancient times, are the rulers of the world; and the great events in the world of mineral art, are not the discovery of new substances, but of new and rich localities of old ones,—the opening of the treasures of the earth in Mexico and Peru in the sixteenth century, in California and Australia in our own day. But in the vegetable world the case is different; there, we have not only a constant accumulation and reproduction, but also a constantly growing variety of objects, fitted to the needs and uses of man. Tea, coffee, tobacco, sugar, cotton, have made man's life, and the arts which sustain it, very different from what they were in ancient times. And no one I think can have looked at the vegetable treasures of the Crystal Palace without seeing that the various wealth of the vegetable world is far from exhausted. The Liverpool local committee have enabled us to take a starting point for such a survey, by sending to the Exhibition a noble collection of specimens of every kind of import of that great emporium; among which, as might be expected, the varieties of vegetable produce are the most numerous. But that objects should be reckoned among *imports,* implies that already they are extensively used. If we look at the multiplied collections of objects of the same kind, some from various countries, not as wares to a known market, but as specimens and suggestions of unexplored wealth, we can have no doubt that the list of imports will hereafter, with great advantage, be enlarged. Who knows what beautiful materials for the makers of furniture are to be found in the collections of woods from the various forests of the Indian Archipelago, or of Australia, or of Tasmania, or of New Zealand? Who knows what we may hereafter discover to have been collected of fruits and oils, and medicines and dyes; of threads and cordage, as we *had* here from New Zealand and from China, examples of such novelties; of gums and vegetable substances, which may, in some unforeseen manner, promote and facilitate the processes of art? How recent is the application of caoutchouc to general purposes? Yet we know now—and on this occasion America would have taught us if we had not known—that there is scarcely any use to which it may not be applied with advantage. Again, how recent is the discovery of the uses of gutta percha? In the great collection were some of the original specimens sent by Dr. Montgomery to various experimentalists. Yet how various and peculiar are now its uses, such as no other substance could replace! And is it not to be expected that our contemporaries, joining the insight of science to the instinct of art, shall discover, among the various sources of vegetable wealth which the Great Exhibition has disclosed to them, substances as peculiar and precious, in the manner of their utility, as those aids thus recently obtained for the uses of life? Before we quit this subject, let us reflect—as it is impossible, I think, not to reflect when viewing thus the constantly enlarging sphere of the utility which man draws, from the vegetable world—what a view this also gives us of the bounty of Providence to man; thus bringing out of the earth, in every varying clime, endless forms of vegetable life, of which so many, and so many more than we yet can tell, are adapted to sustain, to cheer, to

benefit, to delight man, in ways ever kind, ever large, ever new, and of which the novelty itself is a new source of delighted contemplation."

But it is time to close our chapter and take leave of the learned Doctor, duly acknowledging the gratification and instruction he has afforded us.

CHAPTER XVIII.

THE NAUTICAL DEPARTMENT.

GENERAL REMARKS—MODEL STEAM-BOATS—SHIPS OF 'WAR—SHIPS' MACHINERY—THE QUEEN MAN-OF-WAR—THE PIQUE, THE INCONSTANT, ETC. — GUN BRIGS—SAILING VESSELS—ABERDEEN CLIPPER SCHOONER— ROYAL YACHTS—GRAVESEND BOATS—MOYEN-AGE SHIPS—LIFE BOATS—THE NORTHUMBERLAND PRIZE LIFE BOAT—LIFE PRESERVING CONTRIVANCES—SIR W. H. HARRIS'S LIGHTNING CONDUCTOR.

THERE can, we apprehend, be little doubt in the opinion of all connected with, or interested in, naval art and the national science of ship-building, that Great Britain, in her maritime capacity, was not adequately represented in the Exhibition. If there was any one department of industry—any one national pursuit to which, more than another, the place of honour, in all the meanings of the phrase, ought to have been assigned, it was surely that connected with our much-boasted empire of the seas; we ought to have had a complete epitome of the naval architecture of the realm, and, if possible, also, a complete epitome (both by means of models, of course) of the history of ship-building in England from the earliest times; we ought to have been able to trace our progress from the days of the coracle and the primitive galley, founded, perhaps, in a great measure, upon Roman models, to the last screw-propeller man-of-war, launched from Woolwich or Plymouth, or the last crack yacht set afloat at Cowes. A few ancient models were certainly to be found in the naval gallery; we had a model of a Roman war-galley, with four banks of oars, very curious; and another of the famed ship of Henry VIII., which carried him to the conference of the Field of the Cloth of Gold; another of a first-rate, built in the time of Charles I.; and several of the not ancient, but old-fashioned, tubs in which Rodney and his sea-dogs won their battles. The collection was, however, but fragmentary; we had only scattered links of the chain, which, if completed, would have formed one of the most interesting and purely national portions of the Exhibition. With these remarks, which we will not extend, we now proceed to describe the main features of the collection which was actually brought together.

It consisted, then, principally, of models of ships of war, showing their lines; and, in a few cases, of section models, showing the arrangements between decks. Many of the former class of models were in what may be called *bas-relief*—that is, only one side of the vessel was represented, the object simply being to show her mould and run. These were arranged upon the western wall of the Exhibition, and were principally representations of vessels constructed in our naval dockyards within the last twenty years, many of them having been built during the long contest which agitated the naval world between the surveyor of the navy and his numerous antagonists. There were also a fair number of models of steam-boats—some screw and some paddle—some in relief and others entire. A large passenger-ship or two were exhibited, showing some of the most recent improvements in interior arrangements; and, after glancing at a number of minor

rigged models of schooners and cutters, introduced rather as specimens of the skilled neat-handedness of their builders, than as exemplifying any principles of naval architecture, we came upon a vast variety of plans and inventions for life-boats. On the other side of the stall on which the life-boats, of which we shall treat hereafter, made so conspicuous a figure, was arranged a great variety of models of ship machinery, particularly that connected with anchorage, such as capstans, windlases, chains, and anchors themselves. We had then a number of compasses and graceful designs for binnacles; and, lastly, after inspecting an omnium gatherum of naval odds and ends, such as the gun-harpoons for striking whales, and almost equally formidable weapons for shooting ducks from punts, models of oddly-shaped ships with sliding keels, catamarans constructed out of spars of wood, and air-tight bags acting as buoys, we came to an infinity of diving apparatus, illustrative of the entire process of adventuring, remaining, and working below water.

We will first briefly remark upon the bas-relief models of men-of-war. Had the set been complete, or had specimens of different ages been copiously given, the observation of the gradually shifting forms adopted in our dockyards would have been specially interesting. As it was, however, we could gather from the collection hints not without significance. The first thing which strikes one in modern ship-building is the cutting down of the hulk, which our ancestors were fond of rearing above the water. The castles, quarter-decks and poops, with which they delighted to encumber their vessels, began first to give way at the bows; and the forecastle has long been a mere name, the thing having vanished more than a century ago. It was not, however, until a much more recent period that the mountains of timber piled up astern began to be reduced; and the naval battles in the latter third of the last century were fought by ships of the line with taffrails rising forty and sixty feet above the water. The tendency of improved ship-building is now to lay the whole expanse of deck as nearly as possible upon the same level. A few smaller vessels, we believe, have been actually built flush from stem to stern; but, at all events, the modest height of the quarter-decks now constructed contrasts strangely with the old notion of the symmetry and propriety of a towering poop, ornamented with all the art of the carver, and furnished with range over range of quarter galleries. Beneath the water-mark the tendency of advancing ship-building has been to adapt the curve of the swelling side and the concave portions of the ship, which, in nautical phrase, "take most hold of the water;" so as to prevent, as much as possible, the heavy and injurious rolling motion, which is increased by the quantity of weight a man-of-war must carry above the water to cause the ship to sit as stiffly as may be, and heel over as little as possible—thespecial desideratum in a fighting vessel—and to arrange the lines of flotation so that the lowest tier of guns shall be carried at least three or four feet above the water line. To these divers qualities the naval architect has, of course, to add the considerations of that of speed, and the delicacy of the ship in answering the slightest touch of her helm. The peculiarities of modern improvement in all these respects are easily observable, upon comparison of an old-fashioned with a newly-built hull. The bows of modern men-of-war are sharper and far finer than the old style; and there is more of the concave shape about them—a form which flings the seas sideways and backwards instead of abroad, as the old bluff bows used to do: the belly of the ship is by no means so round as it used to be, the sides or walls being far flatter, an improvement which diminishes the tendency to roll; and the dimensions of the part of the ship immediately before the rudder, called "the run," and in which the convex form changes into a pure and finely modelled concave, diminish so as to allow the body of water displaced to close quickly and easily, flinging its full force upon the helm. The spectator will observe that in modern ships this run is of larger dimensions than in the olden craft. An exception

to this rule is, however, in some degree to be found in the vessels built under the survey of the navy. Take the *Queen* for example, a first class man-of-war of 116 guns: a full model of her hull was exhibited, which for bluffness, and, to modern eyes, clumsy ugliness of mould, could not be beaten by any of the ships which carried the flags of Byng or Rodney. The merits of the *Queen* have accordingly been long a fruitful theme of controversy in the naval world. Her best qualification is, we believe, that she carries her guns well out of the water; but she is slow, and rolls tremendously in a sea-way. In the lines shown of new frigates and gun brigs, it is curious to observe the approach to the style of building which has been long ago adopted in the construction of yachts—the bows sharper and finer than ever; "the runs" of great size and delicacy of mould; and the height of the ship attaining its extreme point when measured from the taffrail to the lower extremity of the stern-post. The effect of this latter arrangement, taking into consideration that the ships in question are made to sit with the stern low in the water, is to cause them to draw many more feet of water aft than forward, to give them great steering power, and a strong, firm hold of the water. The attention of the spectator might be profitably directed to the models of the *Pique* and the *Inconstant*, two of our heavy first-class frigates. Of these, the former seems the more graceful; but the latter has proved herself the most efficient vessel. Both the *Pique* and *Inconstant*, however, belong to the old school. Our first-class frigates are now rated to carry fifty guns, and beautiful specimens of these are found in the models of the lines of the *Raleigh* and the *Arrogant*—two of the noblest ships on the water, and bigger than Lord Nelson's old seventy-fours.

After inspecting the new-fashioned men-of-war, furnished with auxiliary screw propellers, such as the *Hogue* and the *Agamemnon*—vessels carrying the most formidable batteries of cannon ever borne across the ocean, and no doubt destined to take a conspicuous part in our next naval war—if ever such a misfortune should arise—we may advantageously study the moulds of the little squadron of experimental gun-brigs, the evolutions of which excited so much interest some five or six years ago. There is no department of our naval architecture in which we have made more progress, than in the construction of the small men-of-war, called gun-brigs. The old vessels of this class were a disgrace and a reproach to our dockyards. Over-masted, deep-waisted, ill-modelled, they went down or went ashore with such sad regularity, that they acquired the significant nick-name of "coffins;" but were still—not much to the credit of successive governments—employed as packets, until the last of the fleet was either wrecked or worn out. Now-a-days, the gun-brigs form one of the most creditable departments of the navy. In this department of the Exhibition we saw the models—and beautiful they are—of the fleet, built both by private and official enterprise, the peaceful records of whose cruizes filled so many newspaper columns half-a-dozen years ago. The precise question of their merits was never very fairly settled; but the general opinion was, that the *Mutiné*, the *Daring*, and the *Espiègle* were the flowers of the fleet. The *Mutiné* afterwards greatly distinguished herself on the coast of Africa. The *Flying-Fish*, one of the quickest of the squadron, was so wet, as seriously to interfere with the comfort of all on board; but still, altogether, the vessels in question formed, perhaps, the most beautiful and best adapted squadron which ever went to sea.

A few, but only a few, models of merchant sailing-vessels were exhibited. One of these was a perfect specimen of the latest improvements in first-class passenger-ships; we allude to the model of the hull of the *Owen Glendower*, one of Mr. Green's splendid fleet of frigate-like merchantmen, built at Blackwall. The capacity for stowage in this fine ship is beautifully combined with a faultless outward mould. Her bows are sharp, and have that slightly concave tendency which denotes speed and dryness, and the run

is beautifully fine, and what sailors call "clean." In one respect the *Owen Glendower* differs from the new fashion of flush building, now so prevalent. She carries a quarter-deck not too high, but of more than ordinary length, and sufficiently lofty to allow an airy and comfortable cabin, with berths and state rooms to extend below it. Thus the passengers are accommodated upon the level of the main deck. They have plenty of air and ventilation. The height at which they stand above the sea allows of larger windows being formed than would be possible had they to descend a "companion" to attain their cabin, and thus a handsome airy apartment is secured, removed as much as possible from unpleasant smells, which are always the stronger the further down you go in a ship; while a considerable space is gained beneath for extra stowage. A similar arrangement now very generally holds in the American packets; and different modifications of the same plan, such as round-houses, cuddies, and so forth, have been long familiar to the passengers of East India ships. Forward of the deck cabin, in the *Owen Glendower,* is an excellent arrangement of pens for live stock, and a compact cooking apparatus; while the crew are accommodated beneath a raised forecastle upon exactly the same principle as the passengers abaft.

Above Mr. Green's fine ship stood a rigged model of a class of vessels which is making great and rapid innovations on our old-fashioned mercantile marine—an Aberdeen clipper schooner. The port in question has taken the lead in the production of this very beautiful, very safe, and very fast class of vessel. Indeed, the Scotch ports on the eastern coast, particularly Leith and Dundee, stand conspicuously out for their excellence in constructing a new class of exceedingly elegant and exceedingly fast-going ships, which will, no doubt, gradually come into universal use. The "clipper" is constructed upon the general theory, that a small amount of stowage-room may be advantageously given up to secure a great amount of speed, and with that speed a preference for cargo and a greater degree of safety from the accidental risks of the sea; since no one can dispute that a vessel able to go ten or twelve miles an hour, stability not being sacrificed, must, in the nature of things, be a more secure ship in every respect than one which is able to go only five or six. The clippers were, we believe, first built to carry up perishable cargoes of salmon from Norway and the north of Scotland to the Thames. They are now commonly used in traffic for the conveyance of easily-spoiled goods, and for that of cattle, which are deteriorated in condition by being long at sea. The general fruit trade from the Mediterranean, the orange trade from the Azores, as well as the Scotch coasting traffic, are now almost entirely carried on by clippers—craft of as beautiful an appearance on the water, as any of Cooper's slaving, pirate, or privateer schooners, and able to go from the Nore to the Humber in the time which a clumsy Newcastle brig would take to work down the Swin to Harwich. The fast increasing class of screw-propeller boats—principally devoted to traffic in cattle, between the Thames and Ireland, and Holland—are also built and rigged on clipper principles; and Aberdeen has recently been asserting her right still to continue in the van of the race in naval architecture, by building clipper ships of large tonnage, one of which, in a voyage from China lately, beat an American ship, loudly trumpeted as the fastest vessel which ever bore the stars and stripes—and consequently, of course, in the opinion of Yankee-land, the fastest in the world. The model in the Exhibition showed that the Aberdeen clipper schooners, while they are formed abaft much upon the ordinary moulding of a yacht—that is, as we have explained, with a long and fine run, and very high from the bottom of the stern-post to the taffrail—are modelled forward upon the principle of the bows of a Clyde steamer—involving great sharpness, rising into a concave shoulder of exaggerated hollowness, compared with that mere tendency to concavity that we have described as characterizing many new vessels, both men-of-war and merchantmen. The effect of this construction is not to

prevent the vessel pitching, but to cause her to pitch without being wet; the overlapping portion of the bows flinging the water downwards and backwards from the obstacle, while the sharpness beneath enables the ship to slide quickly and steadily through the water. As yet, with few exceptions, the clipper-build is confined to coasting craft, but the initiative has been taken in the construction of large full-rigged ships upon the same principle; the success of more than one of which, sailing from Liverpool and Aberdeen, has lately formed the subject of newspaper paragraphs. Of the coasting craft, a few, but only a few, clipper brigs have been built, the majority of the smaller vessels being schooners. In the rigging, considerable improvements, both as respects lightness and elegance, have taken place. The clipper is less towering aloft than the old-fashioned hermaphrodite schooner; but her yards are squarer, her boom and gaff longer, and she is thus enabled to carry as great a spread of canvass and to manage the cloth with more facility than the loftier rigged vessels. The old hermaphrodite schooner carried fore-mast, fore-top-mast, and fore-top-gallant-mast, and occasionally even a fore-royal-mast, in all four pieces. The clipper uniformly contents herself with a fore-mast and fore-top-mast, making up for the diminished height of the "stick," by the great squareness of the yards—the fore-top-gallant-yard being sometimes, if we mistake not, made to come down upon the fore-top-sail-yard, so as to compact the rigging and diminish the leverage of the swing of high and heavy top hamper. The clipper has, further, an air of smartness and ship-shape which the ordinary merchant coaster is far from pretending to. She can go at double the speed of the lumbering collier brig or coast schooner, and shows beside them, too, like a hunter compared with a couple of dray-horses.

The steam-boat models were numerous, and not uninteresting. A number of bas-reliefs were shown of vessels in the process of construction by Mr. Mare, for the General Steam Navigation Company—craft of beautiful design, and which will, no doubt, turn out very fast; and there was a half-model of a 2,000-ton steam screw-propeller yacht on the stocks, for the Viceroy of Egypt, which has since been launched, and which deservedly attracted a great deal of admiration. A large model of a new paddle-wheel steamer, fully rigged and complete, down to the minutest details of finish, was placed in a prominent position, facing the eastward-running inner gallery, and repaid minute inspection as a peculiarly perfect model of a first-class craft of her species. She was flush-decked and carried swivel signal guns upon her paddle platform. The floats of the wheels were disposed, not after the too common fashion, in a plane with spokes, but perpendicularly, so as to strike the water edgewise, and to expend the whole force of the paddle upon a productive lateral, and not an unproductive downward movement. A number of contrivances, more or less ingenious, of feathering paddle floats were displayed, but we understand that it is found in practice that machinery of this sort, however theoretically plausible, and however supported by abstract scientific laws, has such an unfortunate tendency to get out of order, as to counterbalance the nominal advantages. With improved mechanical contrivances, however, it is quite possible that the feathering system may yet be made practically available—unless, indeed, the screw achieve the final overthrow of the paddle-wheel.

The models of the *Victoria and Albert* and the *Fairy*—the well-known royal yachts—excited much attention. We do not know, however, whether we are to place perfect credence in the miniature presentment of the larger vessel. Soon after the launch, it was pretty generally reported that she was a contemptible botch, and that all sorts of tricks and sly patching had been resorted to in order to make her sail respectably. Whether these stories were true or not, we cannot vouch, but it was often asserted, and never denied, that, as in consequence of some mistake in her lines, the *Victoria*

and Albert went fastest when down by the head, she was ballasted so as to bring her into to this position, and then built up upon, so far, of course, merely as the bulwarks went, and newly painted, to conceal her awkward sit upon the water. Be that as it may, however, the *Victoria and Albert* now goes very quickly through the water; a consummation for which she has, in some degree at least, to thank the immense steam power wherewith she has been provided. The *Fairy* is a sweetly formed and almost faultless little craft. Her speed in smooth water is wonderful, and the good weather she manages to make in rough, considering her shallowness, is equally marvellous. In crossing the Irish Channel in a gale of wind, the day her Majesty returned from Belfast, we are told that, except mere spray, she did not ship a couple of buckets-full of water, while we can bear personal testimony to the fact, that the sea washed in tons over the fore part of the deck of the *Caradoc*, one of the new crack Holyhead and Kingstown packets, while crossing at the self-same hour. Not far from the models of the royal packets, was one of the screw steam yachts, built by Mr. White, of Cowes, for the Emperor of Russia. The *Peterhoff* seems much such a vessel as the *Fairy*—very fast, extremely elegant and graceful upon the water, and made a good sea boat by the very force of her lightness and buoyancy, combined with a sharp wedge-like outline, which enables her to slip through head seas, offering them but a very trifling resistance.

In the same case was a large handsome model of a Gravesend boat, the *Jupiter*, said to be the fastest on the river Thames. She is immensely long and narrow, with vast paddles, and will probably go at high velocity, but is only intended for smooth water. Close to her was deposited a curious contrast, in the shape of a model of a Roman galley, showing the way in which the oars were worked on board these eminently clumsy vessels. Beneath the water-line, the model is round and lumpy, with very little indication of a run, but we much doubt whether any authority exists for the exact mathematical proportions actually observed by the early Italian shipwrights. What may be called the main deck is very low down indeed—a mere flooring, in fact, above the keel; but upon it are erected double platforms of four different heights, each platform seating five or six rowers, who grasp the vast sweeps by which the vessel is propelled. The arrangement of these sweeps is curious. The circular holes through which they pass, run diagonally from the upper gunwale sternwise towards the keel, the benches within, of course, observing a similar disposition. Upon small patches of deck, running round the bulwarks, and crossing from side to side—somewhat in the fashion of a steamer's paddle-bridges—the warriors stand; and at the stem and stern there are species of covered receptacles surrounded by circular wooden roofs, which afford shelter from the weather and the sea. It is difficult to get anything like a clue to the actual accommodations for the residence of a number of men in these ships. The slaves who rowed—and awful slavery it must have been to tug these long heavy sweeps—probably took up their sleeping quarters upon the pricking for the softest plank" principle.

The two *moyen-age* ships—the *Harry Grace de Dieu* and the *Royal Sovereign*, built by Charles II., were well worthy inspection. The former model was rigged, the latter only a hull; her form and general mould, however, differing in no remarkable respect from, and showing little advance in construction, over her predecessor, although the latter was built not less than 113 years before her. Both ships are piled up with huge unwieldy masses of forecastle and poop. In the *Harry Grace de Dieu*, a number of circular sentry-boxes, or watch-towers, rise all round the bulwark, as though it had been the outer wall of a fortification; and the port-holes are surmounted by ranges of loop-holes for musketry. The *Royal Sovereign* appears to have been built rather for purposes of pageantry than war. She is elaborately carved, principally with Roman emblems and devices: but we

miss the warlike appendages of turrets and pepper-box towers which gave the true *moyen-age* ships the air of sailing castles—the idea of the architects having, indeed, manifestly been to manufacture a species of feudal floating fortress. The rigging of the *Harry Grace de Dieu* shows us the earlier stages of the combination of the still existing square rig, with the lateen disposition of yards common to feluccas and their northern offspring—luggers. She carries three masts rigged square, with huge round tops; the two after-masts showing the lateen rig, which afterwards changed into the common schooner fore-and-aft mode of slinging the yards, still in existence, and which is based upon the same principle as the felucca arrangement of the Mediterranean. Altogether, the two models are so interesting as to make us again regret that they only show two incidental eras in the history of our naval architecture—two accidental links in the chain which began with the log or bark canoe, and ends for the present with the 120-gun ship, carrying 84-pounders on her lower decks, and flinging thousands of pounds of iron at every broadside.

The general characteristics of the life-boats exhibited, took for their common principle of buoyancy the construction of an air-tight lining in the interior of the boat—the space between the outward and the inward sides of the vessel gradually widening until a very broad gunwale is formed. In other specimens, the air-tight cell was placed lower, running in the form of a square or circular box round the boat. A few specimens were fitted with cork belts and finishings. There were several adaptations of surf-boats, built open beneath, the buoyant agency being placed entirely in the sides, thus letting the seas break in and out—the level in the water of the boat being never altered: the bottoms of some of the life-boats consisted merely of cross bars, on which to rest the men's feet. The United States showed several surf-boats, or oblong spherical cases of metal to contain air, for passengers to be conveyed in them, for a short transit through the breakers. The Lowestoft and Yarmouth life-boats had their buoyant apparatus in the sides beneath the thafts; the oars double-banked, and beside every man was a pump for getting rid of the sea when it filled the boat. A label attached to these boats stated that they are in use over a range of coast of about twenty miles; that not one of them has been ever upset, and that they have saved from 500 to 600 lives. The "Infallible Life-boat" was a whimsical construction, entirely open at the bottom; and made, indeed, exactly after the same fashion, bottom and top. A Land's-end life-boat was remarkable for the horizontal cuts or longitudinal openings, like loop-holes, piercing her sides in continuous lines; beneath she was open to the water. Holbrook's iron bottomless life-boat was well worthy attention; as was also Bonney's life-boat, which had been experimented on in the Serpentine and the Thames with unvaried success. Two boats, also of a novel kind, were exhibited by Erskine: one propelled by new pinion-wheels and self-acting syphon pump; the other fitted with revolving air-tight cylinders, life-protecting rings, &c. Haly exhibited his "Catamaran," and a salvage-boat, wholly formed of metallic tubes, serving as atmospheric and hydraulic chambers, with loaded keel and self-shifting wheels. South Shields and Whitby also had their respective ingenious inventions; and Skinner exhibited his Aberdeen "Momentary-motion Life-boat," possessing the self-righting power under all interruptions. Dyne's Life-boat is built with diagonal battens, laid lattice-wise; its outer sheathing formed of gutta-percha: its buoyancy is 350 cubic feet of air, capable of sustaining upwards of nine-and-a-half tons, and letting off shipped water by 3,600 holes; in the convexed bottom are three perforated steadying fins, and between them two tons of water, not one ounce weight to the boat when upright: there are also galvanised springs placed at the stern, to act like railway buffers in collisions; besides fusees, rockets, and other lights. The same inventor exhibited a Portable and Folding Emigration Life-boat, to be put in requisition in a few minutes;

and, in wreck, to carry provisions for 100 persons seven days. The Patent Collapsible Life-boat was exhibited by the Rev. E. L. Berthon, and was stated to enable passenger vessels to take to sea enough boats for any emergency, without crowding the decks: they are always ready for use, "frapped to under the davits;" and, on casting off the gasketts, the boat flies open, and takes into fore and aft cells a large supply of air.

The Northumberland Prize Life-boat.—It will be recollected, that in October, 1850, in consequence of the accidents that had happened to life-boats around the coasts of Great Britain, and more especially the lamentable case off Shields, in December, 1849, when, by the upsetting of the life-boat, twenty of the best pilots out of the Tyne were drowned, his grace the Duke of Northumberland offered a reward of 100 guineas for the best model of a life-boat; the result being that 280 models and plans were sent to Somerset-house for competition. After a laborious examination of the several models, the six boats that stood first on the list were, for the third time, placed side by side, their several points again examined, and the models carefully compared with each other; the result was a confirmation of the former numbers, and to Mr. James Beeching, boat-builder, of Great Yarmouth, was adjudged the premium for the best model. The report of the committee appointed to examine the models is a very important and interesting document; and, besides recapitulating the peculiar features of several of them, details the requisite qualities of a life-boat; the accidents to life-boats; the number of shipwrecks on the coasts of the United Kingdom; the life-boat, rocket, and mortar stations; the meritorious conduct of the coast-guard service; and suggestions for decreasing the number of wrecks, &c. The form given to this boat would make her efficient either for pulling or sailing in all weathers; she would prove a good sea boat, and in places such as Yarmouth, where there are always plenty of hands to launch a boat, her weight would cause no difficulty. By means of the raised air-cases placed at the extremes, the absence of side air-cases for a length of ten feet amid-ships, the introduction of two-and-a-quarter tons of water-ballast into her bottom when afloat, and her iron keel, this boat would right herself in the event of being capsized; although, from the form given to her, it is highly improbable that such an accident should occur. One day in November last this prize boat made a trial trip out to the Goodwin Sands, and proved herself of the most extraordinary qualities as a sea boat. Captain Charlwood, the inspecting commander of the district of the coast-guard, with Lieutenant Simmons and Mr. M'Donald, the master of the *Rose* revenue cutter, and a crew of fourteen picked men, went out in her to the Goodwin, where she was placed in such positions as to allow the surf to have the greatest effect upon her. Nothing could exceed the admirable style in which she behaved; and enough was seen to satisfy the officers and men who were in her that she would weather the most tempestuous sea. Her sailing qualities were also tested with the most successful results; indeed, it is said that if it were possible to throw her on her beam ends she would not go over. Such was her buoyancy, that when filled with water she cleared herself to the grating in about twelve seconds. The success of the boat has been the source of much gratification along the coast.

Life-Preserving Contrivances.—A variety of buoyant articles of clothing were exhibited: they might be worn as every-day clothes; and included "yachting jackets" and ladies' paletots, described as capable of supporting the wearer in the water. Many other means of support in the water were shown; such as belts, to be inflated by the breath, and lumps of cork, threaded like beads, to be put round the body. Waterproof trunks, made so as to serve as supporting media in the case of shipwreck, were exhibited, with models illustrating their easy adaptation to the purposes of rafts. Air-tight mattresses were shown, suitable for hammocks and berths, and which, of course, are exceedingly buoyant; together with "floating buoyant settees," (with air-tight gutta-percha cases,

for the decks of passenger steamers; and a marine floating chair for three persons. There were likewise exhibited Carte's life-buoy (circular belts); swimming-gloves, web-fingered; and swimming-boots, the soles fastened to flat pieces of wood, to which are attached flaps or leaves working by hinges; India-rubber cloaks, capable of being inflated, when they become small buoys or boats; and Caulcher's cork-ribbed jacket, to be worn, without inconvenience, whilst rowing a boat. In the American department were several buoyant contrivances, made of vulcanised India-rubber, for saving life under peculiar circumstances. The apparatus of the Royal Humane Society was exhibited; including their ice-boat, constructed of wicker-work, covered with raw hides, and from its lightness easily propelled on the ice to the broken spot; the breaker ladder, with air-tight barrels, on wheels; the ice-sledge—two canoes united by thwarts into a floating platform; rope-drag, and pole-drag; the latter by an air-tight cylinder rendered a floating-drag. Here, too, were exhibited the life-boat and models of the National Institution for the Preservation of Life from Shipwreck. There was also shown Light's invention for rendering ships' boats so buoyant that they become life-boats; by filling the spaces between the timbers and beneath the thwarts with a very light material, and covering it with thin boards; and, should the bottom be stove in, the frame, held together by the fibrous material, would float as a raft. The process can also be applied to any part of a ship, or boat, its mattresses, or other furniture, so that each may become a life-buoy. Grapnel shots, with mortars for their projection, to aid wrecks, were exhibited. The shot had attached to it a strong but light line; and consisted of loose curved arms, which fly out on being disengaged from the gun: when the line being pulled from the shore, the implement fixed in the bottom, anchor-like, and the boat's crew had the means of warping themselves off. Of the same class was the rocket-gun, for carrying a 600-yard line from the shore to a wreck, or *vice versâ*. Another model proposed to project a small anchor to the wreck; another to propel a line without the use of gunpowder; and next were shown the life-boat and mortar apparatus of Captain Manby, the venerable patriarch of this family of humanities.

Sir W. S. Harris's Lightning Conductors for Ships.—Among the nautical inventions, were exhibited practical models to illustrate the system of Conductors, invented by Sir W. Snow Harris, and now employed to protect the ships of her Majesty's navy from lightning. In the principal model was shown the line of conduction on the masts from the vane-spindle to the step; to the keel at the sides, and at stem and stern; and in the other models were seen the plan and construction of the conducting plates, showing the alternate jointing of the plates, &c. Copper was selected as the best conducting metal, and was in rods three-quarters of an inch in diameter; each mast having its conductor, "permanently fixed and connected with bands of copper passing through the sides of the ship, under the deck-beams, and with large bolts leading through the keels and keelson; and including, by other connections, all the principal metallic masses employed in the construction of the hull. Under such a system, a discharge of lightning falling on a house or a ship, finds its way to the earth or the sea, without the possibility of danger. The great principle in applying such conductor, is to place the ship or building in the same electrical condition it would assume supposing the whole were a solid mass of metal, or as nearly as may be; and the conductor should be applied so that a discharge of lightning falling on the general mass cannot enter upon any circuit of which the conductor does not form a part." Since these conductors have been employed in our navy, no damage from lightning has been recorded.

CHAPTER XVIII.

FOREIGN AND COLONIAL DEPARTMENTS—*continued*—ABORIGINAL STATES.

BRITISH GUIANA—CASSAVA BREAD—PLANTAIN MEAL—JUICE OF THE COW TREE—VARIOUS WOODS—PRIMITIVE CANOE—ORIGINAL HAMMOCK—GUIANA POTTERY—SIOUX SADDLE—MODEL OF CARIB HOUSE—NATIVE DWELLING IN GUIANA—WESTERN AFRICA—CALABASHES, ETC.—PALM OIL, ETC.—EGYPT AND TUNIS—ARAB'S TENT—GYPSUM CARVINGS—MALTESE CONTRIBUTIONS.

The first, and perhaps the most powerful and lasting impression received by an attentive visitor at the Exhibition, when looking through its vast collection of articles from every region on earth, was this—that all men, differ as they may in other important points, more especially the uncivilised from the civilised, nevertheless obey at least one law in common: they all, without exception, but in very different degrees of intensity, *labour*. The judgment that man shall live by the sweat of his brow was here exemplified to the full, although a consolatory experience also proves that the curse may largely bring out its own relief. The most careless glance, however, at the multitudinous display of the material results of all men's industry, established some striking distinction in quality among them, even whilst unity in one respect of effort was recognised; and it cannot but be useful to examine the several masses of products in detail, in order to search out the causes of the obvious difference in their respective values. The articles indicated in the title of this chapter—for example, the productions of those who are commonly called Aborigines, or the less civilised races—are substantially the inferior fruits of human industry. Yet they illustrate the primitive elements, out of which the most advanced nations have elaborated their gorgeous and graceful, their eminently useful productions. The most polished nations may in them trace their own perfection backward to its source. Then, these aboriginal productions suggest, in their rude aptitude of purpose, sometimes in their skilfulness, irresistible arguments to the more refined, to look with greater indulgence upon their struggling fellows, by whom such interesting productions are made. The highly civilised man, rendered by science familiar with the works of uncivilised people, will subdue his own prejudices in regard to their incapacity, and soon come practically to aid them to acquire the superior qualifications that shall rightfully place them on his level. China and India have so much in common with us, in their manufactures, their arts, and their agriculture; and they have made so much progress already in many respects, that purely *aboriginal* products are comparatively few in those countries; but both possess some worthy of notice. Ceylon and the Indian Archipelago have sent us more such; and Africa still more, from all its quarters—east, north, west, and south. Turkey, although still too resplendent in "barbaric gold," instead of cultivating the best taste, is fast assuming the great forms of our civilisation; and Russia will bring from its remoter tribes only, anything of a purely aboriginal character. North America, in its prodigious new wealth of products of art and industry, offers some scanty memorials of deep interest from its aboriginal tribes. Central and South America could have presented most curious combinations of civilised and uncivilised manners as now existing, and have sent us remarkable means of comparing the civilisation that existed before the New World was revealed to Europe, with the improvement introduced by Christians at a frightful cost of human life. Both regions, distracted with civil discord, have contributed a little—very little; but one South American British colony, Guiana, has made a zealous response to the call from home. A rapid survey of

these poor treasures of the primitive man's ingenuity, still in his own hands, will unquestionably tend to allay the melancholy feeling too prevalent among us, that numerous portions of our race should be doomed by Providence to perish at the approach of their more instructed brethren. Facts encourage a nobler and a wiser prospect. A capacity for a safer and better condition of life is clearly established by these productions of industry—exercised in every climate, within the burning tropic and at the pole, by Negro and Esquimaux; by the gloomy American forests, and over the bare steppes of Tartary: by the half-amphibious islander of the Pacific equally as by the Kaffir, to whom an iron-bound coast and unnavigable mountain streams refuse the use of the simplest boat—each, however, having his peculiar occupation. All this confirms the oft-repeated judgment, that art is natural to man, and that the skill he acquires after many ages of practice, is only the improvement of a talent he possessed at first. Destined to cultivate his own nature and to mend his situation, man finds a continual subject of attention, of ingenuity, and of labour. The same satisfactory conclusion was supported by analogous materials in the Exhibition, and more abundant ones than the purely aboriginal products. These were the contributions obtained for our daily use by the combined labours of civilised and aboriginal men. They are the raw materials of commerce to an enormous amount in quantity and value; the dyes, the gums, the drugs, the oils, the seeds, the woods, the woven and textile plants, the leaves, the roots, the skins, the furs, the feathers, the shells, which promote so largely the comfort and adornment of social life. The several departments of each civilised nation in turn have received these contributions from the barbarian, and sometimes from the savage—the aborigines—whom, in return, civilisation has not yet discovered a better way to manage, than by almost incessant warfare. It is a capital point, in considering these raw materials of the arts, to know how to obtain them in a *genuine* condition; and on this point it will be found that our interests as manufacturers and merchants, and consumers, coincide happily with our duties as men. Exactly in proportion as the native collectors of nature's stores are well treated and well instructed in the best ways of civilisation, the more expert are they, and the more disposed to be vigilant and honest in their work.

British Guiana.—The survey of aboriginal products in the Exhibition may be conveniently begun with British Guiana, as the collections from the colony were remarkably complete, and it is a country admirably described by Sir Robert H. Schomburgk, one of the most accomplished of modern travellers. It is a portion of South America on the Atlantic, in latitude six degrees north of the equator, and contains forty-eight and-a-half millions of acres of land. The staple produce is sugar, rum, and coffee, with some cotton. Other produce of less value are its plantains and various esculents, with timber and other articles approved by the experience of the aborigines. The chief food of the natives, the cassava bread, was to be seen here; which it is seriously proposed to export to England, as being superior to the potato in nutritious quality, and so much more abundant than any meal known, that a profit of £50 per acre may be gained by its culture. The graters used by the natives in preparing the cassava meal from the root are the manufacture of particular tribes, famous for this business, as others are especially famous for the manufacture of hammocks—the materials probably in both cases being abundant in their countries; as Manchester owes its ancient celebrity to the streams and coals of its neighbourhood. The cassava bread is made in an elastic tube, called the *metappeé*, a very ingenious contrivance of the Indians, says Sir R. Schomburgk, to press the juice from the root, which is one of the most violent poisons before being pressed. After the root is scraped, it is pressed in this tube, plaited of the stems of the *calathea*. A pole in the tube is used as a powerful lever, and weighed down by two persons sitting on it. The juice escapes through the plaited work, and the dried

meal is baked in a pan in a few minutes. A specimen of the machine, as well as of the bread, was in the Exhibition. Another new article of food was also exhibited—the plantain meal—which the Indians use; and our settlers calculate it may be made to produce a gross return of £112 per acre! Well may Europeans be surprised, as Humboldt says they are, upon arriving within the tropics, at seeing the small space of ground that keeps an Indian family. The juice of the cow-tree, sometimes used as a substitute for *milk*, is perhaps more valuable as one of the numerous materials for India-rubber. The physic nut, in common use by the natives, is one of the hundred vegetable medicines of the American forests, well worth further study. There is also a species of Jesuits' bark, of far greater importance, considering its dearness almost prohibits its proper application in our hospitals; and this, also, is well known by the Indians. But the most valuable articles exhibited from Guiana were the woods, originally made known to us by native experience. For ship-building, they are certainly superior to oak and teak; and the bright colours of the specimens strongly recommend them for furniture. In regard to ship-building, it is a curious fact, attested by Sir R. Schomburgk, that one tribe in particular, the Warraus, have been famous builders of canoes and corrials, the durability and speed of which far surpassed any boats from Europe. They made a class of launches, carrying from fifty to seventy men, celebrated in the last revolutionary wars. The timber they selected, the mora tree, is now acknowledged to be the very best for the purpose. Specimens were in the Exhibition. A more primitive canoe was exhibited also, made of the bark of a tree, quickly constructed, of extremely light draught, and portable. Its convenient use in this last respect, carries us back to the days of our most primitive forefathers, when the wicker and skin boat, still to be seen on the Wye and in Ireland, was easily borne on the shoulders of the adventurous waterman, when obstacles impeded his navigation, or he wished to surprise a neighbour at a distant stream. In this collection, too, we observed the original *hammock*, which we have so extensively adopted at sea, and which in France is wisely used in crowded rooms, from which it can be removed by day to purify the air. It is interesting to know that the Indians make their hammocks of extraordinarily strong textile materials, new to us, and of excellent cotton. Nor is it less interesting to learn that the sugar of Guiana, of which specimens were exhibited, has furnished the native people with one comfort from us, which they appreciate. They now grow sugar for domestic use; and the cane they cultivate is universally of the kind introduced by us from the French. Cook found it in the South Seas; Bougainville carried it to Mauritius; and thence, by way of the French West Indian Islands, it has spread, within about seventy years, over the civilised and aboriginal Western World. These aborigines, then, can adopt our improvements. They possess, also, the elements of the potter's art, which usually denotes a decided advance from savage life. The mere savage is content with what nature has provided to put liquids in—a sea-shell, a gourd, a part of an egg; the Indian of Guiana manufactures his buck-pots of clay, a specimen of which was exhibited. In a new edition of Marryat's beautiful *History of Porcelain*, the catalogue of such utensils, from those of Egypt to those of Peru, should be enriched by well-authenticated examples such as these among aborigines. In some instances the aborigines are proved to have completely adopted our usages. From Nova Scotia samples of wheat grown by Indians were sent of the same respectable weight (64 lb. 11 oz. to the bushel) as our own farmers' wheat. The Sioux saddle and hunter's belt, wrought by an Indian maiden, sent by a citizen of the United States, is entitled to be accounted a work of "honest housewifery," quite as much as the carpet wrought for our gracious queen by the three hundred English women. So the New Zealand chief, Tao Nui, who sent his contributions through his London agent, Mr. Gilman surely has ceased to be an uncivilised man. These con-

tributions were, however, thoroughly aboriginal "specimens of New Zealand woods, gums, and bark, flax and flax manufactures." The same conclusions may be drawn in favour of the capacity of the North American Indian to adopt our usage, from the model of the house of the once wild Carib, the cannibal of Columbus, with every household convenience most minutely represented. The easy chair, the wax taper, the neat table, the tinder-box, the old man's modern bed, as well as the aboriginal hammock, various musical instruments, various cooking utensils, the sugar-press, cassava-pot, the grind-stone, the neat mat, even the grog-can and a hundred other articles were there, to show the profusion of comforts which civilisation produces. And yet this is the race, thus making progress under a little protection, to which we often refuse common justice; and then we wonder that they flee to the bush. This little Indian picture of civilised barbarism is a lesson that should be perpetuated by such a simple work being deposited in the British Museum, now that the Exhibition is broken up. The models of Guiana native dwellings, also, were very interesting, as furnishing, in the abundance of their domestic comforts, some guarantee for their permanence in one place, so that they have clearly arrived at a condition beyond that of nomadic life. Other South American *models* were exhibited; for instance, there was one of a native raft in the Brazil department, although none, as far as we could find, of the far more curious flying bridges which span the awful abysses of the mountains. Mexico and New Grenada, Chili and Peru, are no longer subject to civil disturbance so continually, whatever may be the case with Central America, but that their engineering wonders of that character, from very old times, might have been produced with advantage.

Western Africa offered articles so various in kind, so abundant, and so valuable in commerce, that when compared with the barbarism of the people, they irresistibly compel the admission, that trade alone does not solve the problem how men are to be civilised. These Africans, in particular, are most active merchants; and they have one usage which should strongly recommend them, as it furnishes a proof of their respect for honest dealing. If a bale of goods is not found at its place of destination to answer the sample, it may be returned to the broker, who is bound to get compensation from the original seller for the purchaser. The specimens of cotton, both raw and manufactured, from this region, were numerous. The plant grows everywhere; and if our best sort should be found worth substituting for the native varieties, the habits of the people are prepared for its adoption. The pottery works were very various, although calabashes, or vegetable vessels, were common. Dyes and medicines were abundant; and it is to be noted with regret, that poisons are familiar to the natives for the worst purposes. One article of export collected by the rudest people of West Africa is of great value, and it has an interesting history. This is palm oil, the import of which has increased, since the abolition of the slave-trade, from a small amount, to more than 20,000 tons a year, worth more than £600,000. This new African trade in a legitimate commodity is interesting, as a proof of the correctness of judgment in one of the earlier friends of negro emancipation, whose very name has been forgotten in the long catalogue of the friends of that cause. Mr. Thomas Bentley, of Liverpool, a predecessor of Sharp, and Clarkson, and Wilberforce, was sagacious enough to perceive, and bold enough to maintain, when a merchant in that slave-trading port, that some articles existed in Africa more suited to the conscience and commerce of Englishmen than negroes. He told his fellow-townsmen that they should send their ships, not for slaves, but for *palm oil;* and now it is for Mr. Thomas Bentley's palm oil that the very fleets are sent, which, but for the efforts of such men as he, would still be groaning with human victims. This good man became the partizan of Wedgewood, in the famous potteries, to the beauty of which his excellent taste secured their most successful character. From Western Africa

were also sent the small leathern bottles of dye for the eyelids, which along with other like usages have been cited to prove the assimilation of the negroes with ancient Egypt. The real aboriginal products of both regions are well worth comparing together, in order to illustrate the question.

Let us now take a survey of the contributions of Egypt and Tunis; the former of which, in addition to their intrinsic merit, were interesting from the imperishable halo of association that surrounds the land from which they came—a land which has been the seat of four civilisations, essentially differing from each other, and spread over the lapse of 4,000 years; for while Italy and Greece have been at particular periods more resplendent by cultivation of the arts, Egypt is the only country that still shows in its monuments distinct traces of four successive epochs of civilisation—a Pharaonic, a Greek, a Roman, and an Arabic. This, no doubt, springs from the peculiarity of its physical geography, as a country of vast territorial wealth within a narrow space, and forming the connecting link between the Red Sea and the Mediterranean; while to the Englishman, more than to any other inhabitant in Europe, Egypt has become, since the development of steam navigation, the portion of the East, the political condition of which bears most immediately on the communications between our vast Indian empire and the metropolis. There was a time, and that not long since, when our relations with the government of that country were of the most hostile nature; but it is satisfactory to think that the most amicable intercourse now reigns between them. No Englishman in his senses thinks of a military occupation in Egypt similar to that which was attempted by France. The objects of the British government limit themselves,—first, to the exclusion of any European power from military possession of the key of the Mediterranean and Indian seas; secondly, to the development of our commerce in Egypt; thirdly, to the facilitation of the Overland traffic. And it is satisfactory to find, that the present pacha shows every disposition not only to promote and protect our passenger traffic, but to cultivate the most amicable relations with the government and inhabitants of this country. In Egypt the extraordinary change that has been imprinted upon the administration, the commerce, the agriculture, and the manners of the higher classes (for those of the great majority of the people remain untouched) has been effected by the will of one *man*. It is true that Mahomed Ali sometimes misapplied his resources, but there can be no doubt of the extraordinary mental activity of the individual; there can be no doubt that all the productions of Europe have been subjected to study—that their application to European commerce has been tested—that the climate and soil have been studied, and that vast numbers of experiments have been made in the vegetable world, and that many plants have been successfully naturalised, while the indigenous products have been much improved in quality. The Nile is the great feature of Egypt; let us, therefore, begin with the upper country. Highest of all were the articles from the Belledes-Asoudin; elephants' tusks, sections of ebony from Senaar; a rhinoceros horn, and other objects from the "land of the blacks," as the term means, of which the most valuable is gum. Upon this trade the genius of Mahomed Ali, remarkable as it was in many respects, had not a favourable influence; the European regulations and police, which he established with absolute power, rather frightened away than encouraged those who had objects of this description to sell from the interior of Africa; but, as the system of the present pacha is less stringent, there is every prospect of an extension of this portion of the trade. And to this object, unquestionably, nothing would so much tend as the establishment of a fair, once every winter, at Essowan, which is the highest point that can be reached by steamers from Cairo, and is on the borders of Nubia.

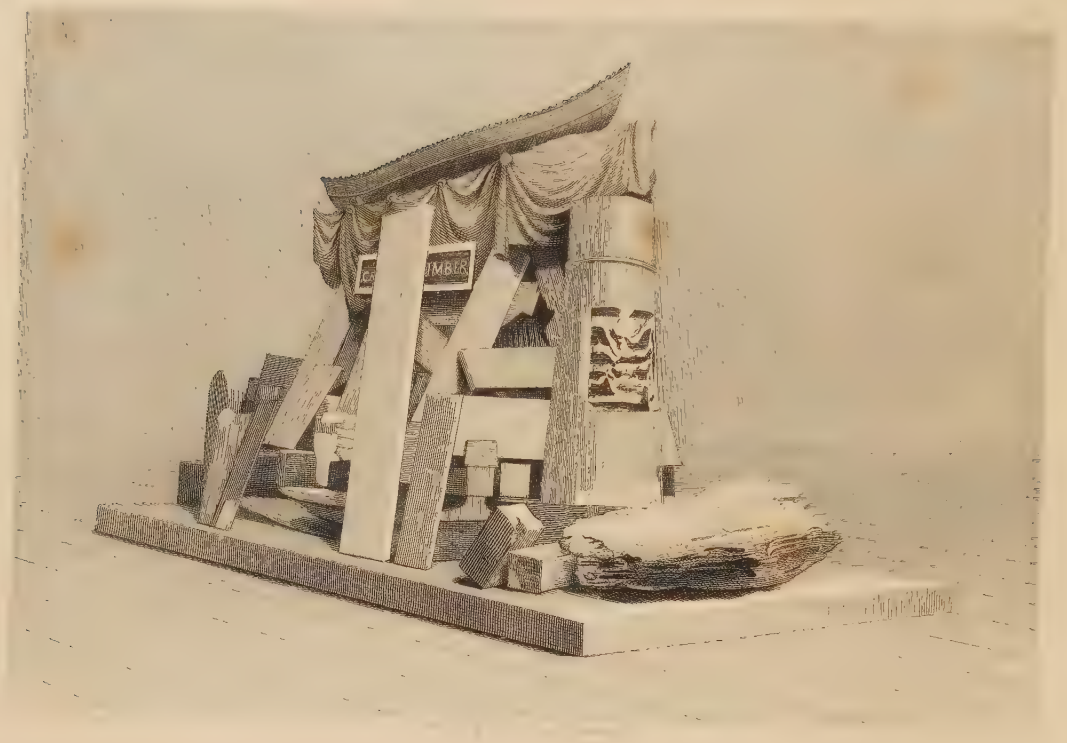
In Upper Egypt itself, the principal objects of production are dates, corn, sugar, and Indian corn; the first of which is the most striking feature of the Egyptian landscape,

and which is almost as familiar to the eye of the European, by thousands of faithful representations, as to the Egyptian himself. On closer examination of the vases in which they are kept, we see the varieties of their colour, some being of a dark red, some of a light brown, and others of a cream colour. Not only is the date an excellent food for the common people of Egypt, but we saw in this Exhibition illustrations of the variety of purposes to which they are applied: here were the crates of the branch of the palm; the fly-flappers of palm leaves, used by servants while the masters dine; and, moreover, specimens of the cordage into which the palm fibres are made, and a coarser description of which is in universal use in the Nile boats. When we add, that the trunk of the palm is used for timber, that the nuts are used both as camel fodder and as a combustible for the preparation of human food, and that, moreover, a tenacious hairy sort of fibre from the palm is used in cleansing the skin in baths, it is scarcely possible to over-rate the value of this tree. Sugar-cane and sugar-loaves were also exhibited, the latter from Ibrahim Pacha's refinery. This remarkable man made great efforts to push the sugar cultivation in Egypt, for which there can be no doubt that both soil and climate are well adapted; but the great proportion of the sugar used in Egypt is still imported from Europe; for, whatever the will of Ibrahim Pacha may have been or whatever may be the natural capacities of Egypt, the incurable indolence of the people and their indisposition to labour, seem to be an invincible obstacle to Egypt ever competing with Europe in price and quality as far as this article is concerned. The true calling of Egypt is, unquestionably, that in which nature herself—the sun and the Nile—have the largest share in the production. It is by her wheat, her cotton, her beans, her barley, her sesame, her linseed, and her flax, that Egypt can increase her wealth with certainty. It is agriculture and commerce, not manufactures, that nature has assigned to Egypt in the territorial division of labour. Of these the most important is certainly cotton, from the great extension of its culture during late years. We particularly remarked a specimen of Sea Island cotton, cultivated by Mr. Larking, in the environs of Alexandria. This ingenious gentleman has devoted many years to the horticulture and agriculture of the Egyptian climate, and has been the means of reclaiming from the Lake Mareotis a large tract of land, which would otherwise have been useless, by diverting from the canal a portion of fresh water, which, washing away from the alluvial soil the saline particles, has left the earth cleansed and productive. He has also been at pains to introduce, upon a most extensive scale, the British system of agriculture, and the Belgian method of cultivating flax; but the inveterate habits of indolence and pilfering in the natives have prevented the experiment from being so successful as could have been wished.

In the Exhibition was to be seen one of those curious machines with which the Egyptians conduct their agricultural operations (marked 174 in the catalogue), which show that the ease-loving countryman makes his own weight contribute to do the work, while he is saved the trouble of walking. The catalogue stated that the object of this machine was to sow seed; but, unless we were much mistaken, it was the machine used for the double purpose of thrashing corn and cutting the straw; the oxen performing a rotary motion until all the straw be cut and the corn squeezed out. Of other vegetable productions were specimens of opium and senna, which are well suited to the climate; tombak, which is used as a substitute for tobacco; and rice, which is grown in very large quantities on the low grounds of the Delta, not far from the sea, and cleaned for the most part at Damietta and Rosetta, where mills have been established on the American principle with great success. Nor must we, in our list of vegetable products, omit the rose-water of the Fayoua, which is so frequently mentioned in the songs of the Arab poets; whole tracts of land being devoted to this culture, and, in the season of plucking, diffusing fragrance through the smiling land. It is also in the Fayoum (which is a district to the

west of the Nile above Cairo) that are to be found the greatest quantity of olives, large plantations of which have been re-established by Ibrahim Pacha in various parts of Egypt; for the culture of olives had much fallen off under the Mamelukes. The mineral productions of Egypt were very numerous, the most magnificent of which, in the Exhibition, were the slabs of Oriental alabaster, from the quarries to the south-east of Cairo, in the desert, and out of which material the columns of the new mosque of Mahomed Ali, in the citadel of Cairo, have been constructed. There can be no doubt, that, if the value and the beauty of this mineral were better known in Europe, and if a railway, of however rude and cheap construction, could be established to Beni Souef, on the Nile, it might become an article of export of the greatest importance. As a native manufacture, having a mineral for its component, we may also draw attention to the porous water-bottles made at Gheneh, on the Nile, which are in universal use in all parts of Egypt, from their peculiar quality of exuding the moisture, which by evaporation cools the water within. If we descend the Nile to the entrance of Cairo, we see another mineral production, in specimens of the petrified forest of a valley in Mount Mokattam. The Cairo articles must be regarded under two aspects—those which are indigenous, and those which have been introduced by the late pacha as subservient to his military and political system. The latter need not engage our attention, as they have no local peculiarity, however illustrative they may be of the superior mental activity of the family of the present pacha. Of the former, we may mention the saddles of crimson velvet, the padded one being most easy and convenient for riding, giving a good hold to the knee; but the high cantled saddle is the most interesting, for it is of the same form as that in which Saladin and the Paynim host used to receive the shock of the Frank crusader; the saddle of Negm-Eddin, whose name is so associated with the expedition of St. Louis to Damietta, being still an appendage of the mosque, that, after six centuries, bears his name. In no respect had the desire of Mahomed Ali to leave his impress upon his country been more successful than in his efforts to promote public instruction; and the schools he established in Egypt will unquestionably do more for his reputation than the wars in which he was engaged. The printing-press at Boulak has been sufficiently described by travellers; and we have had specimens of its work in an Egyptian edition of the "Arabian Nights," and other productions of typography; the works themselves being remarkable, not so much for their beauty of print and paper, in which they cannot compete with Europe, as for the excessive lowness of price. The articles of dress are so numerous, and are brought in such quantities by travellers to this country, that we need not up take the reader's time any further; simply remarking, that while many of the imitations of European manufactures have not been successful as pecuniary speculations, that of Tunis caps, established at Fouah, has been in operation for many years, and has been eminently prosperous.

The Tunis court was the first on the right hand after passing through the iron gates at the south entrance. In front it was the width of a single division; but in the rear it was more extensive. The collection of Tunisian productions which were sent for exhibition by the bey of Tunis, under the care of Sy Hamda Elmkadden, pro-commissary appointed for the occasion, and Moses Santillana, interpreter to his Excellency General Sidy Mahmoud Benyad, the bey's commissioner, were more remarkable as matters of curiosity than for their intrinsic value or importance. The most striking features in the outward show were some carpets, rugs, and blankets, and a variety of singularly-fashioned garments, for male and female, of a mixed material of silk and worsted, and of all shades and mixture of colour; caps of various denominations—calabash, orta, sake, majidia, kaleb-shed, &c.—turbans, and other head-gear; silk scarfs; in short, an endless stock of gentlemen's and ladies' "left-off-clothing"—just such a stock as one might



COLLECTION OF CANADIAN AND VAN DIEMANS LAND TIMBER

expect to see in a native old clothes' shop at Algiers or at Cairo. Two hats of gigantic proportions, in red morocco, were the astonishment of all beholders. In the inner room were others of similar dimensions, but made of straw, and ornamented with leather patches. The shoes, boots, and slippers of red, green, and yellow morocco, attracted the attention of the curious, as also some very substantial saddle-bags of the same material, which, divided in two, might form very serviceable packs for a walking tour in Wales or Switzerland. Then there were samples of seeds, of saffron, of indigo, and glass jars full of sweetmeats, which last-named the good-natured Turk in charge very freely dispensed, with wild gestures of welcome, to gaping juveniles as they passed. Arms and gun-locks, of clumsy make, were displayed in another compartment; in another various articles for domestic use, made of iron, tin, leather, and pottery, and of very primitive fashion; squares of "household soap," some candles also, veritable "dips" of a dirty brown colour. In another we found musical instruments, including a lute and a timbrel; and strewed about in all directions were skins of animals, dressed and undressed; pieces of matting, parasols, fans, ornaments in gold and silver; claret-bottles filled, some with scented waters, some with Begia snuff; and all sorts of odds and ends, mostly of the rudest description, but all admirably calculated to afford an illustration of the *menage* and *convenances* of the North African tribes. A tent made of camel's hair cloth, which stood in the middle of the room, was a perfect picture; low, dark, dismal—a mere shelter for the mountain wanderer from the blast and the rain; in which saddles, saddle-bags, leather water-bags, leather bottles, leather mats, clumsy arms, and other articles for immediate use, and adapted for prompt removal, were scattered about in admired disorder. In strange contrast to this tatterdemalion lot stood two glass cases, containing some very splendid specimens of gold embroidered dresses and horse caparisons, and other articles of *vertu* selected from the bey's private wardrobe. Nor must we omit to mention some very curious models of arabesque carvings in gypsum, intended for the decoration of the interior of Moorish rooms. Their workmanship was of a bold character, the devices elaborate and pleasing; and the material being pierced through, must have a very light and graceful effect when applied to the purposes intended. Preparatory to the process of carving, the gypsum is inclosed in a wooden frame, with a back to it, which supports and protects it till the design is completed.

Maltese contributions.—The interesting and historical island of Malta—the ancient Iberia; the rock made fertile by the labour of man; the conquered of the Greeks, the Romans, the Carthaginians, the Goths, the old Normans, the French, and the British—made a goodly show at the Great Industrial Gathering. There is a lingering tinge of romance about the island of so many possessors; and as we gazed on the products of the industry of its inhabitants, we recalled to our mind recollections of the chivalric band, the heroic knights of Jerusalem, successively driven from Palestine and Rhodes; and at last, in 1583, taking refuge, through the favour of Charles V., on the little island in the Mediterranean, the name of which they subsequently assumed. We thought of their grand master, Villiers de l'Isle, who fortified the rock and resisted the designs of the Turkish emperor Soliman; and the words of Sinan, when he surveyed the castle of St. Angelo, rose to our lips: "Dost thou see that castle?" he asks of the corsair, Dragut, when pressed to commence the attack; "the eagle makes not his nest on the summit of a steeper rock. To take it we must have the wings of the eagle, and the courage of the lion; for all the troops in the world would fail in the attempt." A few years later, and we are in the midst of a siege, in which Turks and knights were alternately victorious and defeated—the latter at one time overjoyed and triumphant, and at another retiring to the convent and town of La Valette, carrying on the erection of houses and churches by means of copper coins, on which were inscribed the words, *Non aes sed*

fides. Years pass. The knights of Malta disappear from the scene for ever; commerce takes the place of chivalry; romance retires to its congenial woods and streams; a good queen takes up her residence within view of the waters on which St. Paul suffered shipwreck; the year of jubilee dawns upon the world; and Malta takes her place among the nations in the Crystal Palace. Besides many interesting specimens of Maltese cottons, silks, lace, flowers, and jewellery—wheat and cinnamon, aniseed and sea-shells, were among the contributions of Malta. The gold and filagree-work of the Maltese has been long celebrated, and many highly valuable illustrations of this important branch of industry were exhibited. Besides these, we had bracelets, brooches, chatelaines, breast and head pins, dishes, plates, bouquet holders, shawl pins, shirt studs, card cases, candlesticks, and pincushions. But perhaps the most important and certainly the most interesting objects in a pictorial point of view, were the vases, jugs, pedestals, and carvings, in Maltese stone, a material highly useful in many respects, as was shown by the specimens oiled and prepared for pavements, the drip stone, &c. In these productions the elaboration of the carvers had been well seconded by the efforts of the artist; and as good specimens of Maltese ingenuity, they were highly valuable. An inlaid marble table, with the arms and emblems of the island in coral and lapis lazuli, with some table tops of a similar description; a vase, with a pedestal of red Goza marble; several rare figures, and some fine stalactites, were exhibited by Messrs. Darmanni and Son, of Valetta, and sufficiently indicated the talents of the manufacturers and the resources of the island. Malta, in the Exhibition, was situated between India and Ceylon, and next to the Channel Islands; or, to make the description still more accurate, we may say that it was situated N.N.W. of the Crystal Fountain. Thousands of travellers journeyed thither without the fear of sea sickness.

CHAPTER XIX.

MODELS.

MODEL OF A COLLIERY—FOURDRINIER'S SAFETY APPARATUS—SUSPENSION BRIDGE OVER THE DNIEPER—SALTER'S MODEL OF A BRIDGE AT SELBY—STEPHENSON'S BRITANNIA BRIDGE—RAILWAY BRIDGE OVER THE WYE—STEPHENSON'S HIGH LEVEL BRIDGE—OUSE-BURN VIADUCT—SHIELDS' MODELS FROM NEW SOUTH WALES—MODEL OF THE FALLS OF NIAGARA—STANZAS BY J. S. BUCKINGHAM.

Models are still more instructive than drawings, or even than the machines themselves. The Exhibition afforded some striking and interesting examples of the advantages of such means of illustration. We would especially direct attention to the model of a colliery, which was to be found in the department of machinery. No one, even amongst those who have themselves practically explored coal mines, can fail to be struck with the clearness of perception which is obtained of such works from this model. Thus we had, first, those parts of the works which are above ground exhibited, such as the mouths of the shafts and the engines which work them. There was, first, the shaft by which the coal is raised; next, that by which the mine is drained; and third, that by which it is ventilated. This latter process is usually accomplished by a furnace, which creates a draught of air up one of the shafts, and is necessarily followed by currents of air down the others. In the lower part of the model was exhibited the state of the workings. The

BRIDGE, BOLTON, LANCASHIRE

HAMBLE

beds of unworked coal were represented by a black *stratum*, the workings being exhibited by cuttings through it; the railways being shown upon which the waggons move, in which the coal is brought to the bottom of the shaft, and through which it is elevated by the power of the steam-engine erected at the top. The partitions and other contrivances to regulate the ventilation of the works were represented by brickwork in this interesting model. The timber supports used for sustaining the roof of the workings were also shown. Coal mines, or coal fields, as they are sometimes called, differ from one another in the thickness of the bed of coal and in the position in which it lies. In some the thickness does not exceed eighteen inches; in others it amounts to many feet. In the coal fields of Northumberland and Durham (from which the model was sent) the average thickness is twelve feet; and, consequently, each acre contains 19,360 cubic yards of coal, each cubic yard weighing, on the average, one ton. The extent of the coal area in Northumberland and Durham is, in round numbers, 500,000 acres, and, consequently, its total contents amount to not less than 10,000,000,000 tons of coal, of which 1,500,000,000 only have been worked. The present annual consumption of coal is estimated at 10,000,000, including the waste; and it consequently follows that, at this rate, it would take above *eight centuries* to exhaust this single field! Not the least remarkable circumstance suggested by this model, is the prodigious depth at which this subterranean industry is carried on. In some cases, the depth of the workings is 1,800 perpendicular feet, or one-third of a mile; and the area of a single set of pits sometimes amounts to 1,000 acres. The manner of working the beds might be collected, in some measure, from inspecting the model. The coal itself is first cut in narrow galleries—that is to say, a space is excavated twelve feet high and four or five feet wide,—and such a gallery is continued in a given direction for a certain distance, as represented in the model. Others are then excavated parallel to it; afterwards a series of similar excavations are made at right angles to these; the result of which is, that there will remain square pillars of uncut coal, formed by the intersection of these rectangular galleries; and the plan of the bed will resemble a chess-board, the black squares indicating the uncut pillars, and the white the open cuttings, only that the square pillars do not touch each other diagonally, as in the case of the chess-board. The use of these square pillars is to support the roof, which would otherwise fall in. After the bed has been worked in this way by parallel and rectangular galleries, the square pillars of coal are removed one by one, and the roof of the working is allowed to fall. This method of working a coal mine is called technically the method of "pillar and stall."

The apparatus for the ventilation of the mine, as indicated in the model, is extremely important, inasmuch as upon its efficiency the safety of this class of industrial labourers mainly depends. The gas, which by artificial processes is extricated from coal for the purposes of illumination, is found to issue spontaneously from the coal in the mine, in more or less quantity; so much so, that by holding a candle against the walls of the workings, jets of flame may be often produced. When this gas is mixed in a certain proportion with atmospheric air, which fills the workings—a mixture highly explosive—if a flame or spark comes in contact with it, a destructive catastrophe ensues. Good ventilation prevents this evil. The current of air kept continually flowing through the workings, descending at the shaft No. 1 and No. 2 in the model, and rising at the shaft No. 3, is a safeguard against the evil; but, as this ventilation sometimes fails, a further security is afforded in the safety-lamp, which, as is well known, is a lantern surrounded with fine wire gauze, instead of glass or horn. This wire gauze has the property of preventing the passage of flame through it. Flame is nothing more or less than gas rendered luminous by intense heat. In passing through the wire gauze, it parts with so much of its heat to the metal of the wire, that when it has issued from the meshes, it loses the

character of flame, and is incapable of producing explosion. According to the returns, it appears that in the Newcastle and Durham coal field, represented by this model, there are about 200 pits or different collieries, employing 26,000 pairs of hands; the value of the coal at the port, where it is shipped, being about 11*s.* per ton. This, however, is only one of the many astounding examples which the Exhibition presented to the foreign visitor, of the inexhaustible stock of this valuable mineral, which lies embedded in this island—to say nothing of the Irish and Scotch specimens.

There were samples from South Wales, accompanied by models of the apparatus used for shipping the coals at Cardiff dock, where 400 tons per day can be shipped by steam-power, from a coal field presenting about 600,000 acres of coal area, consisting of the sorts best adapted for steam navigation, and thence called "steam coal." There were also, supplied by the Butterly Company, specimens of the Derbyshire coal field, consisting of seams of coal of great thickness. Mr. Atkinson sent specimens of coal from the Forest of Dean, where there is an area of 36,000 acres, the total thickness being about thirty-seven feet. Specimens were sent from Barnsley, from a bed ten feet thick, forming part of the South Yorkshire, Nottinghamshire and Derbyshire coal field, which includes 650,000 acres, of which there are twelve workable seams, of the total thickness of twenty feet. It appears, in fine, that the total extent of coal area of the British Islands amounts to 12,000 square miles, being about one-tenth of the entire area of the country; their annual production, 32,000,000 tons. With such a stock, and the prospects of those improvements in mechanical science, which will probably supersede steam-power by electricity, the fears of the timid respecting the exhaustion of our coal mines may well be tranquillised. With a knowledge of our resources, we may yet sit round our firesides in comfort.

Fourdrinier's Patent Safety Apparatus for ascending and descending Mines.—Doubtless many thousands of the visitors to the Crystal Palace passed the model of this safety apparatus, without being at all aware of its utility and importance. The national greatness of this country, in a commercial point of view, in a great degree arises from the immense mineral wealth it possesses, more especially of iron and coal. Under the most favourable circumstanstances, the operation of exploring for these valuable products beneath the surface of the earth, is fraught with many and great dangers; and, it is he only who has actually passed through the ordeal of descending and ascending a mine, that can form any adequate conception of the dangers of a miner's life. We were particularly struck with this fact a few days since, whilst reading the returns of the population of the mining districts of Cornwall, and noticing the number of *widows* in those returns. The mere fact of working at great depths below the surface, where the exhilarating influences of the sunbeam—so essential to health and life—never penetrate, is of itself sufficiently toilsome and wearying, even if the miner were never subject to any other ills. The terrors of the fire-damp we shall not at present notice; but confine our attention to the dangers attending the mode of ascending and descending mines. The miners place themselves in a basket, or "cage," as it is commonly called, and are lowered to, or raised from, their work by a rope or chain. If either of these break from any accidental circumstance, or are, as is unfortunately sometimes the case, wilfully cut, the unfortunate men are dashed to pieces at the bottom of the shaft. From a return of the number of deaths from accidents in mines, in 1848, we find that out of 415 cases, eighty-nine were from breakage of ropes or chains. The apparatus has been severely tested in several mines, and has been proved to afford an amount of safety to the miner, which he has not hitherto enjoyed. It consists of a cage or basket, attached to guide-rods or chains, and was represented as carrying two tubs of coal down the sides of the shaft, and the rope or chain holding the cage was shown as broken; the self-acting springs or arms, forming

levers attached to the top of the cage, were liberated, and these being wedged most securely upon the guide-rods, the cage became necessarily fixed and its descent arrested. The apparatus has thus no chance of falling more than a few inches, after the rope or chain is broken, and the stop is at the same time so complete, that no danger is to be feared from any recoil. In an experiment made at Usworth Colliery, Durham—the cage, containing two tubs loaded with coal, the whole weight of cage, tubs and coal, being 48 cwt.—when the rope was disengaged, the apparatus instantaneously took effect, and the whole mass was firmly fixed to the guide-rods. On another occasion, at the same colliery, the cage, with a total weight of 50 cwt., was safely arrested in its descent, which, but for the "safety" arrangement, must have been precipitated to the bottom of the shaft, 1,000 feet below. But this was not all: two of the workmen then placed themselves in the cage, and by a touch of their hands, stopped this weight of 50 cwt. and themselves in addition, instantaneously; and so satisfied were four of the gentlemen present of its efficient nature, that they unhesitatingly committed themselves with a load of upwards of 40 cwt., to its *protecting operations*, with the same *successful results*. Another arrangement has been introduced, by which the casualties arising from the rope being drawn over the pulley are entirely prevented. It must be understood that this apparatus is perfectly self-acting, and that the greater the weights which may be in the cage, the tighter do the wedges hold upon the guide-rods, in the event of any accident taking place. The inventors of such an apparatus are well deserving of a "civic crown."

Suspension-Bridge over the Dnieper.—This model, by Mr. James, of Broadwall, Southwark, gave an accurate idea of the stupendous works erected over the river Dnieper, by command of the Emperor of Russia. It was designed by Mr. C. Vignolles, and is the counterpart of a similar model made for the emperor, at a cost of more than £12,000. Considered as a work of great engineering skill, it was the most perfect thing in the whole building. Only fancy the difference between the state of Russia—by no means a first-class nation—now-a-days, and its condition when Peter the Great came to England for information, and worked as a ship's carpenter in Plymouth dockyard! And these improvements come not out of a spirit of conciliation existing among the nobles of the imperial court, but are thrust on its attention by the irresistible force of that progressive feeling, which has found a voice even among the serfs of South Russia. Nicholas the First may not know the fact—but it is nevertheless a fact—that in building the suspension-bridge over the Dnieper at Kieff, he is not only providing his subjects with a safe and commodious means of passage over the deep and rapid river, but that he is advancing the cause of science and liberty all over the world. The suspension-bridge, a quarter of a mile long, in place of the crazy erection of boats hitherto employed, is only another instance of the march of mind, and the supremacy of nineteenth century civilisation. As to the model itself, it will be sufficient to say that it was constructed on a scale of an eighth of an inch; all the details were finished with such nicety, even to the size of the bolts and chains, that a perfect bridge on a large scale might have been executed from it; and that it consisted of 6,880 pieces of wood and 87,097 separate pieces of metal. The Emperor of Russia was so pleased with the model, of which this was a fac-simile, that he gave Mr. James a diamond ring, said to be worth £200. It is now set up in the winter garden of St. Petersburg. The models of the great Britannia Tubular-bridge, connecting the island of Anglesea with the main land, and that of Mr. Brunel's bridge over the Wye, were extremely interesting; the first especially, as forming part of our great net-work of railways which are rapidly intersecting the country.

Salter's Model of the Great Opening Bridge at Selby.—Amongst the interesting models exhibited, that by Salter of the great opening bridge at Selby, on the line of the Hull and Selby Railway, was particularly worthy of notice, the work represented being of so

novel a character, on account of its large span. The river Ouse is at all times rapid, and particularly so during the times of the frequent freshes or floods; it required, therefore, that a bridge of peculiar construction should be resorted to, in order to meet the requirements of the case. By the act of parliament for the Hull and Selby Railway, which obtained the sanction of the legislature in 1836, it was stipulated that the bridge at Selby should have an opening arch of forty-four feet span, for the sea-borne vessels trading to York. Messrs. Walker and Burges, who have erected so many of the cast-iron bridges which are dotted about in different parts of the kingdom, were engineers for the railway; the bridge, therefore, was executed under their direction; the contract for the iron work being undertaken by the Butterfly Iron Company, and carried out with the usual spirit displayed by that firm. The river, at the point of crossing, is about 200 feet in width and, at low water, fourteen feet in depth, the tide rising nine feet at springs and four feet at neaps. The bed of the river consists of silt, resting on a thin bed of sand, beneath which is clay of a hard quality. The bridge was commenced in the autumn of 1837, and finished in the spring of 1840. The land abutments are constructed of brickwork and masonry, resting on piles; those under the west abutment being eighteen feet, and those under the opposite abutment, twenty-eight feet long respectively. The intermediate piers for the support of the superstructure are formed of open pile work, the piles being driven fifteen feet into the solid clay, and their tops surmounted with cap sills of large scantling, upon which the iron-work is bedded. To give additional stiffness to the two centre piers, a plan was resorted to in the bracing, which, although novel in itself, was executed with very little difficulty, and is found, after years of experience, fully to answer the purpose. This was effected by rounding the centre piles for a portion of their length, so as to allow the cast-iron sockets to descend and take a solid bearing on the square shoulders of the piles, to which were connected the long timber braces; so that when the socket, with the braces attached, were let down to their bearings, the tops of these braces were brought to their places at once, and secured to the cap sills.

Stephenson's Britannia Bridge.—The model executed by James, of Broadwall, was to a scale; all the parts bore an exact proportion to things as they were. The bridge consisted of two tubes, forming the up and down lines; and each tube was made of four different parts, namely, two land tubes, of 230 feet span each, and two centre tubes, of 460 feet span; when these had been raised to their proper position on the piers (at a height of 103 feet above high-water mark,) they were joined together to form one. The total weight of the two tubes was about 11,000 tons. In the model, one tube was shown complete, stretching across the Straits; and the land tubes having been built on scaffolding in the position they now occupy, the scaffolding was shown. The two central portions of the second tube illustrated the transits of the tubes from the platforms on which they were built, to their ultimate destination on the piers; one tube was shown being floated to the basement of the piers, and the other in the act of being raised by the hydraulic presses.

The Railway Bridge over the Wye, at Chepstow, by Brunel, was a novelty in engineering. It was composed entirely of wrought-iron. One span was 300 feet, and the others 100. The principle of construction adopted in spanning the 300 feet, seems to have been that of an extravagant trellis; the principle of the trellis was of the same character as the Britannia tubes or any other beams or girders,—that is, the top was subject to compression, and the bottom to extension. This bridge had two lines for the up and down trains. The span of 300 feet consisted of two huge trussed girders, the bottom of each being composed of two simple wrought-iron beams, which resist tension, and between which one of the lines ran these beams being formed of boiler-plate and riveted together. These

two girders were supported at two points, 100 feet apart from each end, from a wrought-iron tube above, which stretched across the whole span, and this tube resisted the compression. This tube also was raised at a considerable elevation above the bottom girders, so that the weight, such as trains, &c., passing along the line, might be properly resolved or distributed over the tube by means of the tye-rods and stays; the 100 feet spans being crossed simply by wrought-iron beams.

Stephenson's High-level Bridge, at Newcastle-upon-Tyne, was also exhibited in model, by Hawks and Co., who were contractors for the iron-work. The banks of the Tyne, both at Newcastle and Gateshead, are exceedingly steep, and are connected by a viaduct, 1,375 feet in length, running at a height of 112 feet above high-water mark. There are six principal openings, each of 126 feet span. The principle of construction is the bow and string; the arches, which form the bow, are of cast-iron, and the rods, which form the strings, are of wrought-iron, to resist tension; there are four arches to each span, two on each side; which bear properly on the piers, through the medium of bed-plates, on which the arches rest; and the strings of each arch consist of two wrought-iron rods, keyed to the arches of the abutments. Cast-iron columns, connected to the arches, support a platform above, on which three sets of rails are laid, and they also support another platform below for a carriage-road, the footpaths running between the two arches on each side; this road, in fact, runs along the strings, but has no connexion with them; the arches take the whole weight of both platforms, above and below, leaving the strings independent, to resist only the tension. The iron-work required the adjustment of an immense number of parts; yet no joints, and hardly any fastenings are to be seen; in fact, it is difficult to make out how it has been put together.

Ouse-burn Viaduct.—Amongst other objects of interest exhibited by B. Green, of Newcastle-on-Tyne, was a model of the central arch of the Ouse-burn viaduct, on the Newcastle and North Shields Railway; the arches were of timber, built up of layers or planks sufficiently thin to allow being bent to the required sweep. The arch having thus been built up to the required size, was bound together by iron straps, bolts, &c. It was then scientifically strutted, to resist and distribute the thrust properly.

Shields' Models of Bridges, &c., from New South Wales, were exhibited in the colonial department. These engineering contrivances are especially suitable for New South Wales, where, the cost of iron-work being very considerable, the engineer has to economise to the utmost extent the use of this valuable material, and in cases, where practicable, to dispense with it altogether. Mr. Shields' model of a "lattice bridge," and also that of a "railway trestle frame," were of the latter character; and were, therefore, suitable for many other parts of the world—New Zealand, for instance, which abounds with valuable timber, suitable for bridges and similar works. The American engineers have long paid considerable attention to the best disposition of timbers in the construction of their bridges and extensive railway viaducts; and these have been followed, to some extent, both in the railways of England and Ireland. Mr. Shields' lattice bridge is of round timber, thus getting rid of much expense in the shape of labour, and also in the entire absence of iron fastenings. The model consisted of three lines of vertical round timbers, properly notched, and having two perforations to receive the horizontal timbers. Between each pair of vertical timbers were two diagonal pieces, resting at the bottom on cross-timbers, and framed into the vertical timbers at the top. There were three double sets of horizontal timbers, the upper ones supporting the joists placed transversely, and to which the floor-boards were secured. These joists projected on either side of the bridge, in order to gain additional width of roadway; a wooden railing, properly strutted, completing the whole. The "railway trestle frame" was intended specially as a substitute for embankments in countries where labour is dear

and timber plentiful. The framing was similar to that of the lattice bridge. A third model showed Mr. Shields' economical method of laying the rails in New South Wales, which is the same as that adopted in the north of England, and to a great extent in America; but the peculiar mode of placing the rails and securing them to the timbers were the novel parts of the design.

Model of the Falls of Niagara.—Among the various models found in several parts of the Great Exhibition, was one of the Falls of Niagara, which deservedly attracted a large share of public attention. This model was transferred by Mr. Catlin, from his collection of American Indian productions, and faithfully represented the "Horse shoe" and American Falls (the former descending 150 feet, and the latter 163 feet). The various mills, hotels, residences, roads and Goat Island, extending to seventy-five acres, embraced an extent of country equal to nearly a square mile; and, being constructed to the scale of ninety feet to an inch, every object was very distinctly shown. The amount of water descending over the two falls is said to be equal to 1,715,000 tons per minute, and which is chiefly derived from the drainage of Lake Superior, Lake of the Woods, Lake Michigan, Lake Huron, Lake St. Clair and Lake Erie. The sublime and reverential feelings the object itself inspires, are finely set forth in the following stanzas, written on the spot, on beholding it for the first time, by that intrepid traveller, James Silk Buckingham, who has left scarcely any part of the civilised globe unvisited; and who, wherever he has turned his steps, has always made the existing condition of the human race the subject of his most eager enquiries, as its advancement and happiness have ever been the objects of his unwearied benevolence.

HAIL! sovereign of the world of floods, whose majesty and might,
First dazzles, then enraptures, then o'erawes the aching sight.
The pomp of kings and emperors, in every clime and zone,
Grows dim beneath the splendour of thy glorious watery throne.

No fleets can stop thy progress, no armies bid thee stay—
But onward, onward, onward, thy march still holds its way.
The rising mist that veils thee, as thine herald goes before;
And the music that proclaims thee, is the thundering cataract's roar.

Thy diadem is an emerald green, of the clearest, purest hue,
Set round with waves of snow-white foam, and spray of feathery dew;
While tresses of the brightest pearls float o'er thine ample sheet,
And the rainbow lays its gorgeous gems in tribute at thy feet.

Thy reign is of the ancient days, thy sceptre from on high,
Thy birth was when the morning stars together sung for joy.
The sun, the moon, and all the orbs that shine upon thee now
Saw the first wreath of glory that entwined thine infant brow.

And from that hour to this, in which I gaze upon thy stream,
From age to age in winter's frost, or summer's sultry beam,
By day, by night, without a pause, thy waves, with loud acclaim,
In ceaseless sounds have still proclaimed the great Eternal's name.

And whether on thy forest banks the Indian of the wood,
Or, since his days, the red man's foe on his fatherland hath stood;
Who'er hath seen thine incense rise, or heard thy torrent's roar,
Must have bent before the God of all, to worship and adore.

Accept then, O Supremely Great! O Infinite! O God!
From this primeval altar, the green and virgin sod,
The humble homage that my soul in gratitude would pay
To Thee! whose shield has guarded me in all my wandering way.

For if the ocean be as naught in the hollow of thine hand,
And the stars of the bright firmament, in thy balance grains of sand:
If Niagara's rolling flood seem great to us who lowly bow,
Oh! great Creator of the whole, how passing great art Thou!

But though thy power be greater than the finite mind may scan,
Still greater is thy mercy, shown to weak, dependent man—
For him Thou cloth'st the fertile fields, with herb, and fruit, and seed,
For him, the woods, the lakes, the seas, supply his hourly need.

Around, on high, or far, or near, the universal whole
Proclaims thy glory, as the orbs in their fixed courses roll;
And from Creation's grateful voice the hymn ascends above,
While Heaven re-echoes back to Earth, the chorus, 'GOD IS LOVE.'

CHAPTER XX.

GLEANINGS AND REMINISCENCES—*(Continued.)*

THE RAILWAY PRINTING TICKET—CURIOUS FACTS—THE QUEEN'S DRAWING-ROOM—WARDIAN CASES—FOX'S MAGNETISED BALANCE—INDIA-RUBRER AIR GUN—SMITH'S COMIC ELECTRIC TELEGRAPH—FIRE-EXTINGUISHING CEILING—SPITALFIELDS' SILK TROPHY—FUR AND FEATHER TROPHIES—THE LADIES' CARPET—FACEY'S ORRERY—SELF-ACTING FIRE ALARUM AND RAILWAY WHISTLE—GRAPHIC DELINEATION—IVORY CARVINGS—COLOSSAL PORPHYRY VASE—MOLLENBORGH'S CANDELABRUM.

The Railway Printing Ticket.—What a simple thing is a railway ticket! merely a square inch of cardboard, coloured blue, white, or green, as the case may be, with certain cabalistic figures across its face, and the names of the towns of departure and arrival printed thereon! Passengers by railway—and they are numbered, now-a-days, by tens of thousands—step from their cabs or omnibuses, not always without a dispute with the driver, pass into the station, walk up to the counter, pay their money, and receive, in return, the little ticket before mentioned. How few travellers by rail ever bethought themselves how that ticket was produced. To be sure, they saw the station clerk pass a piece of pasteboard into a sort of iron cylinder, heard a sharp click, and the next instant saw the ticket skimming across the counter towards them, by means of an official fillip, acquired by long practice; but of the ticket itself they knew nothing, and, of course, cared nothing about it, except as to its actual use. The piece of paper which is to frank them all the way to Liverpool, Edinburgh, Ireland, or elsewhere, is shown to the guard in waiting, as soon as the passengers by that train are seated and ready to start; is passed into a side-pocket, or watch-fob, if the passenger happen to be a gentleman, or carefully deposited in a purse or a glove, if the aforesaid passenger be a lady; and is altogether forgotten by the *habitués* of railways, or nervously felt for, and looked at every now and then, by the noviciates in travelling experiences, till it is peremptorily called for at the end of the journey—"Get your tickets ready!" "Your ticket, ma'am, if you please," is the porter's manner to the first-class passengers; "Ticket, sir," is the style of that official to travellers by the second-class; and "Now, then, tickets!" the ordinary phrase and demeanour adopted towards the riders in parliamentary trains, or the open cattle-trucks, popularly known as the third class. All have their tickets, and all the tickets are alike in form and substance, differing only in colour and numbering. Let us look to the

antecedents of these interesting bits of paper. In the infancy of railway travelling—and even now on some small branches—the passenger-tickets were slips of paper torn from a cheque-book and given to the purchaser, to be delivered up to the guard at the end of the journey. This plan was soon found to be inconvenient; as, although the tickets were made to correspond with the counterfoil in the book, a vast deal of small peddling, no little purloining by the officials themselves, and many mistakes were continually occurring. To avoid all this, the machine at present in use was invented. By it, all the tickets are numbered consecutively from one to any determinate number. The money taken at each station should correspond with the tickets collected at night; and if the chain in the numbering of the latter be broken, then it is known that there is a ticket lost, or that the guard in attendance has neglected to collect it; on the contrary, if the number of tickets exceeds the amount, then it is certain that some individual must have taken a ride without paying for it, through some collusion with the money-takers or guards. In these cases, the money-takers are held responsible. Suppose the tickets issued on, say June 1st, run from 1,500 to 3,500, and a ticket is discovered with 750 marked on it, which will correspond with a number missing from the previous day's reckoning, then it is discovered at once that some person has travelled twice with the same ticket; and the poor fellow whose duty it is to take the passengers' tickets, is punished for not having exercised proper vigilance, by having to pay the amount of the deficiency out of his own pocket. It is interesting to know that all these mistakes are now rendered of very rare occurrence, and that the loss of tickets by pilfering or collusion is made next to impossible by the invention of this admirable machine—which not only cuts millboards into the proper sizes for railway tickets, but prints, numbers, counts, and packs them as well. The consecutive numbering of the tickets is managed by an automatic wheel, which changes the numbers from one to 9999 without any attention on the part of the workman. The reason for thus consecutively numbering the tickets is in order to avoid forgery and the purloining of the tickets from the cabinets in which they are kept. As a clerk removes a ticket, previous to dating it he always looks at the preceding ticket to see if the numbers correspond, that he may know if any have been stolen. When the tickets are collected at the end of the journey they are again arranged numerically, as has been before stated; and thus all chance of wrong-doing is prevented. Where there is little temptation, there is little crime. This machine is now in use on several of the large railway lines.

Curious facts connected with the Exhibition.—Of the money received at the doors, £275,000 was in silver, and £81,000 in gold. The weight of the silver coin so taken (at the rate of 28 lb. per £100) would be thirty-five tons, and its bulk 900 cubit feet! The rapid flow of the coin into the hands of the money-takers prevented all examination of each piece as it was received, and £90 of bad silver was taken, but only one piece of bad gold, and that was a half-sovereign. The half-crown was the most usual bad coin; but a much more noticeable fact is, that nearly all the bad money was taken on the half-crown and five shilling days. The cash was received by eighteen money-takers: on the very heavy days six extra ones being employed during the busiest hours. From them it was gathered by three or four money-porters, who carried it to four collectors, charged with the task of counting it. From them it went to two tellers, who verified the sums, and handed it to the final custody of the chief financial officer, Mr. Carpenter, who locked each day's amount in his peculiar iron chests in the building till next morning, when, in boxes, each holding £600, it was borne off in a hackney cab, in charge of a bank of England clerk and a bank porter. The money was received in all forms, ranging between farthings and ten pound notes. Contrary to the notices exhibited, change was given. Occasionally foreigners gave Napoleons, and these coins being mistaken

for sovereigns, they received nineteen shillings out, and liberty of admission into the bargain. The monies of America, Hamburg, Germany, and France, were often tendered and taken. The total number of visitors from the 1st of May to the 11th of October was 6,063,986.

The Queen's Drawing-room at the Crystal Palace.—This elegant little apartment was chiefly composed of rich tapestry, the interior being lined with pale blue and white silk, fluted. The furniture was of a very costly character, combining lightness of appearance with splendour of effect. The sofa and chairs were carved and gilt, and covered with light blue silk damask. The carpet, of rich Brussels, was a flowered pattern. Flowers, tastefully disposed, lent their aid to give a pleasing and lively effect to the picture. In the rear of the principal room was a smaller apartment, separated from it merely by a draped partition, in which was a handsome cheval glass, in a gilt frame and stand. Crowds of persons daily thronged to view this little *bijou* of a boudoir—at a respectful distance, however—a cordon being drawn around it, guarded by a policeman.

Wardian Cases.—In various parts of the Great Exhibition building, were to be seen live plants, growing, in some instances, under handsome glass shades, and in other cases in glass frames, of so unprepossessing an appearance that one might naturally be at a loss to account for the reason why objects so uninteresting had been sent to the "World's Fair." These contrivances are called Wardian cases; it having been first discovered by Mr. Ward, that by them plants can be transported to and from distant regions of the globe, and also that by their aid the Londoner can succeed in growing a few flowers to cheer his habitation. Some years ago we remember to have seen the vessel about to start to survey the settlement of Adelaide, in Australia, and we were much delighted to see two or three of these cases filled with small gooseberry and currant trees, in order that the emigrants might enjoy those delicious fruits which we have in such perfection in this country; and now not a week passes but ships arrive bringing plants from the remotest habitable regions in these Wardian cases, which have thus conferred upon us a power of procuring exotic vegetable productions, which before their introduction was never possessed. These cases formed, as it were, a little world of themselves, in which those who cultivate plants might observe many peculiarities. From being closed, the heat of the sun bestowed upon them a very high temperature at times, and the hygrometric state of the atmosphere within varied according to circumstances, in a manner which interested the cultivator of plants, and gave him ample means to exercise his observation and talent. In London but very few plants will thrive. The Oriental plane rears its head in the heart of the City, in Cheapside, and forms a stately tree. Russell-square and Guildford-street exhibit, also, noble specimens of this beautiful tree; but coming into leaf late, and shedding its foliage early, it is not so susceptible of those influences which injure other plants. The lime-tree will also partially flourish; and in the very centre of the bank two noble and ancient limes shade the parlour from the scorching sun of summer, and yearly cast forth delicious perfume from abundant flowers. With these exceptions, flowers and vegetable productions can scarcely be cultivated in London, except with the aid of a Ward's case. Residing in the very centre of the metropolis, we now write with two beautiful Ward's cases before us, which exhibit the most luxuriant foliage. In these cases we have at this moment the beautiful wax plant, or *Hoya carnosa,* in abundant flower. We have recently introduced the newly imported and lovely *Hoya bella,* which is also now in flower; and the odoriferous *Francisea Hopeana* is always ready to refresh us by its scent, on opening the door of the case. We have five species of *Lycopodia,* which gratify the eye by their luxuriant green; and no less than fifteen or sixteen species of exotic ferns gladden the sight by their charming forms, their verdant foliage, and luxuriant appearance. The leaves of the *Maranta bicolor,* never soiled by

wet, are of surpassing beauty; and several species of *Achemenes* are rapidly growing to display their brilliant colours in the latter part of summer. Many of our plants have been in their present situation for ten years. In one of the cases exhibited, was a specimen of the celebrated Irish fern growing in full health, and the lovely little Tunbridge Wells' filmy fern also luxuriating. Our country friends will, doubtless, be much surprised when they are told that a small plant of the former fern, which grows wild in the British isles, fetches from ten to thirty shillings in London. The sale of ferns and native orchids has become a trade in London. Mr. Marshall has lately constructed a Wardian aquatic case, wherein he grows many curious plants; and the miniature pond is overhung by ferns, which, doubtless, will thrive well in that situation. By simply preventing the access of the London smoke to injure the leaves, we have this year succeeded in growing cucumbers in the very centre of the metropolis; showing what may be effected when the deleterious gases which emanate from the combustion of coal are prevented from exercising their baneful influence.

Fox's Magnetised Balance.—One of the most interesting objects in the department of philosophical instruments, was Fox's magnetised balance, capable, as was stated, of weighing to the $\frac{1}{10000}$th of a grain: what was the extreme weight which it would bear was not mentioned. The most delicate balance previously in existence, that of the Institute of France, turns we believe, with the $\frac{1}{7000}$th of a grain. Various other chemical balances, as by De Grave and Co., and especially one by Oertling (performing to the $\frac{1}{1000}$th of a grain, when loaded with 1000 grains, or $\frac{1}{1000000}$th of the entire weight), was also worthy of notice. Several balances of foreign make (Lumhe of Berlin) seemed very carefully executed. It is to be regretted that these and various other articles for scientific purposes of foreign make could not have had their prices affixed for the information of the apparatus-buying public in England.

India-rubber Air-gun.—Among the newly invented articles which the Exhibition enabled inventors to bring before the public—although they were not so numerous as they would have been, had a system of protection for inventions been assured at an earlier period—there were some which displayed a considerable amount of ingenuity. As an instance, we may mention the new India-rubber air-gun which was exhibited in class eight, and bearing the catalogue number, 254. It was the invention of Mr. John Shaw, musical-instrument maker of Glossop, favourably known as the author of one or two important improvements in wind instruments. The great singularity of the new air-gun consisted in the entire absence of air-pump, reservoir, and valves, which in the common air-gun are attended by no small amount of trouble, and some personal danger. The air which expelled the ball was powerfully compressed *at the moment of discharge*, by a piston acting within a cylinder, and moved with great force and rapidity by the sudden contraction of a spring, composed of a number of vulcanised India-rubber rings, previously extended by hand in a very simple and easy manner; and the ball was propelled with a force quite equal to that exerted in the common air-gun. It had this advantage, also, that its discharges were always uniform in strength, and could be made with great precision, facility, and safety. Specimens of flattened bullets were exhibited in the case, which shewed its power to be fully equal to the average shots of the ordinary air-gun.

The invention was certainly a most ingenious application of the elastic force of vulcanised India-rubber, an article which possesses so many useful qualities, and the application of which, to a vast variety of purposes, is now so general and progressive.

G. R. Smith's Comic Electric Teleyraph.—Among the telegraphs exhibited in that portion of the middle gallery north of the British side of the nave, which was appropriated to philosophical instruments, one was always sure to attract the attention of those who chose to pause to examine the numerous examples of the application of

electricity, to the transmission of signals between distant places. Surely, the inventor of this contrivance—called a comic electric telegraph—must have determined in his own mind to produce an instrument, at any rate, in external appearance, wholly different from anything of the kind which had previously appeared. In this he has certainly succeeded; but we are not at present prepared to say to what extent a communication, by this instrument, may be transmitted. As the inventor truly says, the instrument would, no doubt, prove an amusing and instructive addition to the ornaments of the drawing-room, as it might be used to illustrate the principle of magnetic induction. The action on the eyes and mouth of the comic face was produced by three bent iron bars within the figure, which were rendered magnetic by induction, and attracted either of the features, by means of armatures attached thereto. In addition to these novel signals, there were also the signs —, +, \, by which not only all the letters of the alphabet were represented, but also the end of each word and sentence respectively properly indicated. These signals were shown by the elevation of shutters above the face. As each of the bars were capable of being separately magnetised, either of the signals could be shown at the will of the manipulator, by touching the corresponding key in front of the figure. The telegraphic alphabet of Mr. Smith was made up of combinations of lines and crosses, and was, therefore, rather of a retrograding character as regards this important branch of telegraphy, which has been sadly neglected by most of the inventors of telegraphs. A bell, used to call attention, was placed inside the figure.

Fire-extinguishing Ceiling.—This automatic contrivance was exhibited by Mr. Bergin, for extinguishing fires in laundries, and other parts of a building, specially liable to such accidents. The inventor proposes to have a large tank, containing water, fixed at the top of the room; this tank to be perforated with holes, and to be fitted with a valve plug, like a shower bath; the plug to be held down by a string, to be fixed near the most combustible materials; in case of fire, the string would be burnt, the plug would rise, and a deluge of water would be showered down on the incipient conflagration.

Spitalfields Silk Trophy.—It was intended at first that the silks of Spitalfields should be contributed by various manufacturers; and that exhibitors in this class should unite in forming a great silken trophy emblematical of their trade. This arrangement, however, was found difficult to carry out, and Messrs. Keith and Co., as manufacturers of the largest kind of silk goods, for damasks, &c., undertook to provide sufficient materials to form a splendid type of the metropolitan silk looms. This was in every way an interesting object; for it showed at one view the industrial products of the Spitalfields weavers, the descendants of those poor French emigrants whom the revocation of the Edict of Nantes drove to our shores—then, as now, the refuge of the destitute and the oppressed of all nations. It consisted of an elegant arrangement of silk brocades, tabarets, damasks, brocatelles, &c., to the height of upwards of fifty feet; the sides of the lower part being intersected with mirrors of immense dimensions, which reflected in certain angles the draped and curtain-like arrangement of the rich and gorgeous materials,—the whole producing an effect at once grand and imposing. The trophy was erected under the superintendence of Mr. George Wallis, the superintendent of textile fabrics, whose original drawings and suggestions were ably carried out and extended by Messrs. Laugher, Dyer, and Co., of Poland-street, Soho, to whom great merit was due for the tasteful and elegant design presented to the public. It was surmounted by flags and emblems, the centre banner being emblazoned with the royal arms; and not the least merit of this elegant arrangement of rich materials was that, by means of interior steps and ladders, the whole might be taken down and re-arranged at intervals with comparatively little trouble or expense.

The Fur and Feather Trophies.—The former exhibited by Messrs. Nicolay, and the

latter by Mr. Adcock, were very attractive, if only for the extreme beauty and intrinsic value of the articles themselves. But considered in another light, and viewed as the products of labour—as the rewards for the hunter's toil in deep, rugged forests, or along the banks of unknown and dangerous streams—these trophies became significant. Suspended from the walls might also be seen numerous specimens of magnificent furs, the outer coverings of numerous varieties of animals.

The Ladies' Carpet.—This praiseworthy specimen of needlework, the joint production of a number of our fair countrywomen, was placed in the left-hand north gallery, just above the crystal fountain, and afforded a valuable testimony of the profitable employment of their leisure hours. They were assisted in their labours by a small committee of gentlemen, who, with Mr. Papworth, the architect, produced a most beautiful design. The carpet was exhibited at the rooms of the Society of Arts, when the ladies who had assembled to inspect the work unanimously pronounced it to be worthy of presentation to Her Majesty. Mr. Francis Fuller, the chairman of the committee, was therefore deputed to learn Her Majesty's pleasure on the subject, and the result was that he had the honour of introducing the Misses Lawrence, Marshall, Cubitt, Simpson, Witten, and Fuller, being a deputation from the lady executants, to Her Majesty, to whom the carpet was presented. The following address was read by Miss Lawrence, who was selected by the deputation to fill the office of spokeswoman:—"May it please your Majesty—On the part of the ladies of Great Britain, we humbly present for your gracious acceptance a specimen of the work that employs the leisure time of our countrywomen. It was commenced with a wish that their skill should have been represented at the Industrial Exhibition of all Nations, but the opinions expressed of their work have so far exceeded their expectations, that they are led to trust it is not unworthy of your Majesty's favourable notice. It is hoped that it illustrates an elegant branch of British industry and taste, and that it develops a source of manufacture which may afford employment to many, especially to those on whom the hand of adversity has been laid. The names of the ladies who have taken a part in the work will be found in the accompanying list, and their initials form the border of the carpet. With deep and loyal feelings of gratitude for the noble patronage bestowed on British industry, particularly in the present year, we offer this specimen of a work of art fit for your Majesty's gracious acceptance." Here followed the list of the subscribers and executants. Her Majesty was graciously pleased to express her acceptance of the carpet, and also her satisfaction at the careful manner in which the ladies had executed the work. The carpet consisted of a large pattern worked out in Berlin wool, by a hundred and fifty ladies of Great Britain. It was thirty feet in length and twenty in breadth, and was produced in the following manner:—The pattern, originally designed and painted by the artist, was subdivided into detached squares, which were worked by different ladies, and on their completion the squares were reunited so as to complete the design. In the pattern, which consisted partly of geometrical and partly of floral forms, heraldic emblems were also introduced. The initials of the executants were ornamentally arranged, so as to form the external border. The whole design was connected by wreaths or bands of leaves and foliage, the centre group representing the store from whence they had been distributed. This beautiful specimen of ladies' work was exhibited by Her Majesty.

Facey's Orrery.—This ingenious piece of mechanism was designed to assist students of astronomy, and was nine feet in diameter. It represented the principal bodies in the solar system, and showed all the planets and their attendant satellites revolving round the sun in their proper order. To effect this in the machine, it was necessary to employ no fewer than 194 accurately adjusted wheels to other apparatus fitted up on a new principle. In the limited space within which the exemplifications were confined, it was

of course, impossible to show either the comparative sizes or distances of the heavenly bodies. The orrery, however, gave a general idea of the relative positions and revolutions of the planets and satellites, whilst a gentleman attended and gave a description of some particulars relating to them. The inventor was a Mr. Facey, who, we understand, is a working man, who, by becoming a member of the Temperance Society, felt it necessary to do something to fill up the vacancy of his idle hours. Accordingly, he was led to the study of astronomy, and this was the result of his labour and ingenuity.

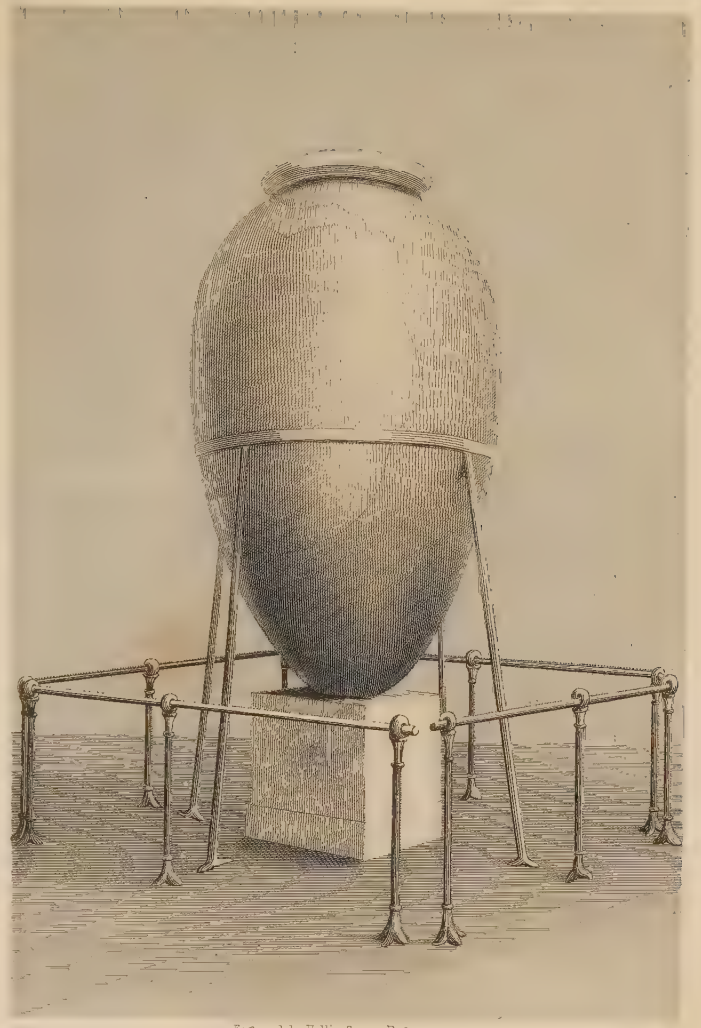
Self-acting Fire Alarum and Railway Whistle.—This was an invention by Mr. D. Lloyd Price, a watchmaker of Breconshire, the novelty of which consisted of an extremely delicate and sensitive expanding compound metallic segment, which might be adjusted to suit any temperature by means of a small screw. The exhibitor deposited two of his instruments in the Exhibition, one of which was removed, by permission of the commissioners, to Somerset House, where it was tested by being placed in a room containing about 2,000 cubic feet of air. The machine being adjusted a few degrees above the temperature in the room, a sheet of paper was ignited, and was found sufficient to raise the temperature so as to set the alarum in motion. The mechanism of the instrument consisted simply of a pulley and weight, and a small lever, which was detached by a helix, the whole being enclosed in a small case about 15 by 18 inches, including the small permanent voltaic battery; and, when once fixed, the inventor states that it would not require to be touched for years, and would always remain like a sentinel ready charged, giving instantaneous notice of the approach of the enemy. One of these instruments is sufficient for a whole building, containing any number of rooms, and it may be fixed in any convenient position for alarming the inmates or police in the event of an unusual increase of temperament in any part of the edifice. It is also applicable to the holds of vessels, where, in long voyages, spontaneous combustion and other accidents by fire are likely to happen. The same principle of construction was applied to the steam-whistle invented by the exhibitor, and may be adapted to steam vessels, or railway carriages.

Graphic Delineation.—It is to the general public that the producer of every article of utility turns for encouragement and support—and it is therefore in the hands of the great body of purchasers that the fate of artistic design as applied to manufactures lies. By their judgment, whether good or bad, the key must be given, in harmony with which the artist and the workman must tune their inspirations. Many, we have little doubt, first turned their attention to their responsibilities in this matter on the occasion of their repeated visits to the galleries of the Crystal Palace. There, probably for the first time, they entered on the task of selection in a serious spirit. Actual comparison furnished them with an unerring test of excellence; and many a lesson on the combination of utility and beauty was doubtless there intuitively acquired. The forms of many of the objects displayed were thus imprinted on their imaginations, as standards wherewith to compare others on which their faculties as judicious purchasers might be subsequently exercised. It is not to be expected, however, that the ideas thus formed could be otherwise than crude and imperfect; and it is fortunate that the power of graphic illustration which is now, happily, so universal amongst us, should bring to their aid the materials requisite for fortifying their memories and reviving their original impressions. Who that remembers the costly engravings which illustrate such works as Stuart and Revett's "Athens," and the early publications of the Dilettanti Society and of the Society of Antiquaries—and turns from them to that wonder of the nineteenth century, the "Illustrated London News"—can fail to recognise the remarkable extension of the power of graphic delineation in this country during the last hundred years? Every draughtsman will at once acknowledge the impossibility of depicting rapidly and correctly an

unceasing variety of subjects without the constant exercise of a nice power of discrimination between those peculiarities of form which confer either beauty or deformity on each different object. The plethora of sketching, which is the great characteristic of the present age, as compared with the habit of our forefathers, may be considered to amount almost to a mania; but, while it indicates the excitable temperament of a public ever craving after fresh food for imagination, it by no means implies the absence of that balance of judgment which should exist in every well-regulated mind. While the unceasing swarm of modern periodical publications accumulates from week to week, and almost from day to day, abundant material for the study of the artist, it ministers largely to the amusement of the public; and not to their amusement only—since it provides for those who are willing to use them, lessons of no slight importance. How many are there whose impressions of picturesque form are derived almost exclusively from these sources—the Protæan variety of which serves to demonstrate, that, when treated by the artist's mind and touched by his skill, almost every diversity of style may be alike invested with the aspect of grace and beauty.

A curious and perfectly unique collection of IVORY CARVINGS was furnished by W. D. Hemphill, M.D., Clonmel. Nothing could exceed the delicacy and grace of these specimens. We had a cup covered with intricate tracery, and yet so miraculously thin in texture as to be quite transparent, and standing upon a stem reduced to the slenderness of a knitting-needle. A hyacinth stalk, with its pendant flowers and leaves carved into a delicate and web-like tissue, that appeared absolutely evanescent, stood beside. It seemed as if a breath would dissolve them, so filmy were the ivory leaves, thin as beater's gold, left by the laborious graver of the artist. The specimens were as beautiful in design as they were exquisite in workmanship. The following were among the most conspicuous:—An ivory vase, on an octagonal pillar, ornamented in the Elizabethan style. The pillar of this vase was double spiral, the outside perforated. It was the best thing in the case. A vase of Hippopotamus ivory, perforated, containing white single hyacinth and jonquil, and standing on a fluted pillar of walrus tooth. A vase of ivory on a walrus-tooth pillar, containing a fuchsia and a lily of the valley. The flowers in this and the preceding were accurately copied from nature. The pillar of the cup was the enamel of the walrus-tooth, which showed its great strength in being able to support the cup without losing its perpendicularity. We are not aware that this substance has hitherto been used for such purposes, as it is generally considered as valueless to the turner. A small cup of Hippopotamus ivory. One dozen dessert knife-handles of African ivory, each of a different pattern, and forming a harlequin set. A pastile burner, of ivory and walrus-tooth, shaped like a Grecian temple. The altar was hollow: on being raised from its plinth a little silver dish appeared, in which was to be placed the lighted pastile, the smoke of which ascended as incense from the altar. A match-holder of African black-wood and ivory. A crochet needle, &c.

The colossal Porphyry Vase graced the avenue of the eastern or foreign side of the Crystal Palace. It was, when exhibited, the property of the king of Sweden; but it has since been presented by that monarch to the prince consort. It, together with a table with inlaid top composed of different descriptions of Swedish stones, was manufactured at the porphyry works at Elfdahl. These, with some carriages, a spinning-wheel, and other curious objects, formed the principal attractions of the closing days of the Exhibition—at least as far as the foreign half of the building was concerned. A large and magnificent Candelabrum, by Mollenborgh, although perhaps not purely artistic, exhibited great originality. It consisted of a stem made to imitate that of a tree, on either side of which was sitting a knight in full northern hunting costume, with dog, gun, spear, and sword. On the upper part of the object, however, there was an addition never seen on



Engraved by Hollis, from a Daguerreotype

IMMENSE WINE JAR

FROM TOBOSO SPAIN

Engraved by Hollis from a Daguerreotype

COLOSSAL VASE OF POLISHED PORPHYRY

KING OF SWEDEN

a candlestick before, at least in England; namely, a painting on glass. But notwithstanding the anomaly of such an addition, the effect was decidedly good. The picture represented the interior of a Swedish dwelling-house, with groups of figures variously employed, the frame being formed of the foliage of the tree beneath. The whole was formed in chiselled silver, and displayed considerable taste in execution, not to say genius in design.

CHAPTER XXI.

ARTISTS' IMPLEMENTS.

INTRODUCTORY REMARKS—MILLER—ROWNEY AND CO.—KEARNEY—ROBERSON AND CO.—REEVES AND SON—WAX COLOURS—BLACK LEAD PENCILS—GERMAN PENCILS—GREEN AND FAHEY—COOK—HARVEY—WATSON—CHEAP FRAMES—GEAR, COMPOSITION FOR IVORY—SIR W. NEWTON—MINIATURES—WINSOR AND NEWTON, CHEMICALS—ACKERMANN AND CO.—GRUNDY.

From the earliest history of painting, we learn that artists were invariably in the habit of mixing their own colours and making their own brushes. This practice has continued within comparatively a few years of our own time. For information with reference to the former fact, we would refer to Mrs. Merrifield's elegant translation of Cennino Cennini's *Treatise on Painting*, which was contributed to our art literature in 1844, and deserves to be extensively known. There are but few, if any, of our artists who now grind or temper their colours, but they, on the contrary, prefer purchasing them from the colourmen ready for use. This practice forms a new era in art, and it may be one of considerable consequence to its progress. The artists, it must be admitted, thus gain some advantage over the old method; although that knowledge of the properties of each colour, its durability or fugaciousness, with which the masters of old were necessarily acquainted, is by this course, in most cases, denied to the moderns. So seductive is this plan, that even the artists of Italy, of Holland, &c., have, upon their arrival in England, fallen into it. It is well known that Mr. Sang, amongst these, when he left Rome for England, partook of the system generally adopted here. This facility he found to his cost not always advisable with regard to every colour; and he had to fall back upon the practice of his native country, and that of many of his Munich brethren in art, and he prepares most of his media now himself, and hence that unrivalled brilliancy and transparency of tints as exemplified in all those of his works painted within the last six years. It may be questioned whether the performance of ancient pictures is not attributable to the elaborate inlight of their painters into the nature of the pigments they made use of; and, above all, to the simple manipulation of their works, and the few colours actually enlisted into their service. It is obvious that the number of colours since the time referred to has been considerably augmented; and now, as may be seen by any list procurable at artists' warehouses, they amount to an aggregate almost sufficient to deter the beginner from entering the lists of art. To those who would wish to make themselves conversant with the several names and the properties of pigments, we would recommend an attentive study of Mr. Field's *Chromatopography*, who, to a profound chemical research into the capacities of all colours for good or ill, adds much information invaluable to artists. Upon matters of detail it must be obvious we should be necessarily terse; although it is

difficult, at the same time, to confine ourselves to generalities where the subject is so replete and tempting; and therefore we plunge at once *in medias res*. It is then with "Artists' Implements" of our own period with which we have to deal, and as they were represented at the Exhibition of which we have to write.

No. 1, in the Fine Art Court, showed us several contributions from Mr. T. Miller, of Long Acre. These consisted of specimens of paintings in "silica colours" and "glass medium," but which appeared to exemplify no one particular virtue unattainable by other pigments. Most of the pictures themselves, more particularly that of the "Genius of Peace," were distinguished for considerable ability in handling, and a correct probationary course of study. In that of Mr. Corbould's "Britons deploring the Departure of the Romans," we fancy we detected amidst its "trick," more particularly in the orange mantle, in the surge of the sea, and on the shore, an indication of "body," and the presence of a medium which belongs less to the element of water, than to that of gums, resinous compounds, or of oil. As a work of art, we object not to the use of any extraneous aid; we have to deal with it as an evidence of the powers of a particular and express fact; and we could, therefore, have desired that, for the sake of art, that which appeals to us as possessing extraordinary claims upon attention, should have brought with it the first necessary proofs of superiority. The brushes in this case appeared admirably made; and, in this respect, Mr. Miller, we believe, stands almost alone, having had a long practical experience in this branch of trade, which requires an intimate knowledge of the wants and caprices of the artist.

Rowney and Co., of Rathbone-place.—These exhibitors savour a good deal of the fashion of the time, and gave us an almost bewildering classification of colours. Their dividing Naples yellow into tints is, however, a valuable exception, and their desire to supply the artist with a cheap, and, at the same time, a good article, is entitled to praise. W. H. Kearney, Brompton, gave examples of crayon painting, executed with his Venetian pastils, which are impervious to damp, and, therefore, adapted to many decorations hitherto beyond the reach of ordinary painting. Roberson and Co., of Long-acre, showed a very good selection of canvass painting-brushes, and pencils, which was indicative of a sterling respectability without meretricious allurement. The palette-knife, for placing the colour on the canvas or panel, without the aid of the brush, is a neat adaptation of the common trowel-handle, and will be found of much service, where boldness of *impasto* is required. There were several specimens of water-colours, in collapsible tubes, admirably adapted for sketching from nature; and a newly-invented oil sketch-book, very light and convenient, and which enables the sketcher to carry two wet paintings without injury. The prepared canvas in the same case was worthy of remark, from its being a successful attempt to give to that fabric the surface of fine panel. Messrs. Reeves and Sons, of Cheapside, contributed a case of some importance to artists, inasmuch as it contained the proofs of an efficient substitute for the far-famed black-lead mine of Cumberland, which is now thoroughly exhausted. It is well known, that, for all purposes having reference to art, this lead of Cumberland was unsurpassable; that no other could compare with it in quality of colour, absence of grit, nor was any so easy to erase; indeed, that no other yet found could be thus made use of in its natural state. That from the Balearic Islands is "cindery," that from Ceylon, though purer than any plumbago known, in the excess of its carbon, and the small portion of iron and earthy matter, is too soft and flaky; that termed Mexican is really produced from mines in Bohemia, and is also friable and earthy. Other varieties, from Sicily, from California, from Davis' Straits', and elsewhere, have been tried, but all have proved unfit for the use of the artist. Cumberland lead was the only black-lead that in its native state could be cut into slices; and thus be inserted into the channels of the cedar

pencils; this being alone a remarkable test of its superior fitness as a native lead. The substitutes for Cumberland lead are manifold, some or all of the varieties of the leads before mentioned being worked into pencils variously designated "prepared," "purified," or "composition." These different leads, by means of gums and resinous matters, are either kneaded in a plastic state and forced into the channels of the cedar wood, or more frequently combined and ground with substances with which they will bake to the required hardness, or with others which will fuse, and the mass solidify when cold. Lustre, intense colour, freedom in working, and ready erasure, Cumberland lead possessed in an eminent degree beyond all other leads known; but its uncertain temper and occasional grit—properties common to all leads in a natural state—gave rise to its amalgamation with other substances which have been enumerated; and though some of the qualities in which Cumberland lead failed have been obtained with varying success by these amalgamations, its especial and valuable qualities when pure have in the same ratio been deteriorated and destroyed. Thus the artist has been left to choose between the evils of a native and a spurious lead, until the somewhat recent discovery by Mr. Brockedon of a process by which lead is made perfect. It would seem that these pencils are especially made for Messrs. Reeves and Sons, and that they are unquestionably what they affect to be.

Another important evidence of successful trade enterprise in aid of art is to be found n the water-colours prepared with wax, as was shown in this case. They dissolve with ease, possess great volume and transparency; and, moreover, they cannot be converted into flint by hot temperatures, so often the fate of the ordinary water-colour. The introduction of a medium of the purest wax into the manufacture of water-colours was a stage in the art of water-colour painting deserving of honourable mention. It has given to this delightful department of art facilities of unapproachable character, and tended to rank it very close to that of oil, which it surpasses in its powers of drying, the advantages of smaller space, and ease of carriage. Very many have been the attempts to give body to the colours used with water, and a variety of media have been used for this purpose. One of these is the more particularly worth mentioning, as showing the avidity with which anything new is seized upon, even by the intelligent and discerning, and the effects which followed a too confiding credulity. We allude to the use of honey for the purposes above stated. This medium certainly had the desired result of keeping the colour with which it was mixed in a moist state; indeed, if the brush was too fully charged with it, those parts of the drawing to which it was applied would not, unless in hot weather, or in a warm room, dry for some time; and even when dry, such drawings, if exposed to a humid atmosphere, became "tacky" again in the folio or elsewhere, and stuck to their unctuous companions in the most sweet but destructive union. A drawing finished with these colours could not be left a moment with safety. The flies, attracted by the tempting treat, would moisten the choicest parts with their probosci, and tattoo the human face divine, or give to that of lovely woman all the appearance of being ravaged by small-pox. It was no unusual thing to find a flock of sheep disappear from a common, a château shattered and unroofed in a night, and a litter of pigs and a cow or two carried away in a *fly*. Nor was the artist himself exempt from the annoyance of their perseverance and pilferings. To paint from summer nature in the open air was to look through a swarm; and the head of the luckless draughtsman became like a hive in the midst of it.

The allusion to a temporary false step in the onward progress of chemical research in art naturally, although in a very opposite category, directs our attention to the subject of "frauds," a very strong term, but nevertheless true—frauds upon artists. It must be in every father's experience—in that of every director of youth—that there is a particular period in a boy's life when the yearning for a "box of paints" becomes positively painful,

according to the amount of difficulty which surrounds its possession. A guinea obtained, the next fancy-stationer's is resorted to for the much-coveted box. There it lies upon the counter, with its lid slightly and mysteriously raised, displaying just enough of its contents to increase a desire of ownership. The prize secured and borne homeward, paper ready, and plate upturned, the attractive colours are rubbed one by one in neat array upon the delf. A good specimen of water-colour has been "lent to copy," and now comes the first essay. All the efforts of the tyro to imitate the flat tint of its sky or the rich *impasto* of the foreground are of no avail. Time and perseverance but add to the vexation. His colours are poor, weak, thin, and washy. He is, however, ignorant of this fact. Young and confiding, the shop which boasts of being "established" at a period when his father was a boy, would never stoop to cheat. He throws aside his attempt and tries again. The acrid qualities of the colours either penetrate through the paper, or, for want of sufficient grinding, their crude and earthy particles are floated about for an instant on the surface, and the next left in spots and patches. Here is a young and ardent lover of nature, stimulated by a noble mind and an intellect delighting in invention, shamefully surrounded in his first encounter by disheartening difficulties which are the more serious because their cause is not understood. At the very threshold of the temple of art he is rudely repulsed by the sordid and fee-seeking, who sell him a clumsy and useless key, and falsely deny that either Talent, or his senior partner Genius, are within. There exists not the shadow of excuse for this abrupt rebuff. The profits upon art appurtenances are large and ample; and the thus adding to positive extortion, the intimidation to modest merit, is as cruel as it is dishonest. But, says the advocate for cupidity, any description of colours will do for a boy to begin with. Then, if such be the case, why charge as for the best? But it is not the fact. It is true that there are professors (save the mark! it is a correct one) of music, who do not hesitate to set a girl down to a piano "of any sort;" but will any rational person, who is impressed with the divine gift of the appreciation of sweet and harmonious sounds, affirm that such a course would not tend to vitiate taste and injure an otherwise correct ear?

We shall add a few more remarks, partly borrowed from an article by Mr. Brockedon, upon the black-lead pencil, a more important auxiliary to art than would at the first thought be supposed. It is not generally known that lead dust, or inferior plumbago, is combined with sulphuret of antimony, or pure sulphur; and the greater the proportion of this ingredient, the harder the composition. When ground with the lead—generally that called Mexican—the compound is put into an iron pot, or frame, and subjected to the degree of heat required to semifuse the combining ingredients. It is then, whilst hot, put under a press, and kept there until it is cold; when it is turned out as a block, ready to be cut into slices, and inserted in the cedars. The impossibility of rubbing out a composition when sulphuret of antimony is used, led to the rejection of the sulphuret and the employment of sulphur only, treating these ingredients as before. This makes a better composition in the quality of rubbing out; but possesses, in a greater degree than the former, a serious evil. The sulphur is readily set free by bodies which attract it, and memoranda made with this composition can be reproduced although rubbed out, so far as with such composition is practicable. If the place where the writing was be wetted with an alkaline liquor, a sulphate will be formed; and if, after drying, it be again wetted with acetate of lead, it will exhibit the writing in sulphuret of lead. This is obviously a most dangerous property for persons who may require to make notes not intended to remain or be again producible. To an artist it may be very injurious as regards the purity and security of his productions, for many of the colours which have metallic bases, are liable to be affected if they come in contact with the lead of sulphured pencils. A ready and simple experiment will place our readers in possession of an infallible test, and thus pro-

tect that portion of them with whom the fact is of consideration from so deceitful an instrument. Draw some lines with the suspected pencil on a sheet of paper, and place these lines in contact with any bright, smooth, silver surface—a spoon for instance; in a few hours, if these lines contain sulphur, corresponding dark lines will be found on the spoon, formed by the action of the sulphur on the metal. A good black-lead pencil may yet more readily be known. It should work freely; be free from grit, yet without a greasy, soapy touch; bear moderate pressure, have a lustrous and intense black colour, and its marks be easily erased. It should be borne in mind, however, that no pencil appears to be the same at all times. This arises from the nature of the paper, whether hard or soft, or the condition of the atmosphere, which affects it materially. The same pencil, on smooth or rough, moist or dry paper, will mark as if four different pencils had been used. The softer or darker degrees of lead are weaker, and yield more readily than the harder varieties.

The varieties of German pencils, with ornamental exteriors, which have recently been imported in large quantities, are, it appears, made of clay mixed with Bohemian lead, and a glass which fuses at a moderate temperature; these materials are ground in water together, and dried slowly to a stiff plastic state, and then put into a vessel like that used for forming maccaroni; under a powerful press this composition is forced through holes in the bottom of the vessel, thus forming the material into square threads of the required sizes. These are laid in convenient lengths in wooden troughs, which keep them straight until they are thoroughly dried. They are then laid in similar troughs or channels on iron plates, and put in a muffle or furnace, subjected to a degree of heat sufficient to render them hard and insoluble, and are then placed in the channels cut into the wood, and glued there; the degrees of hardness depend upon the proportion of the ingredients. All these pencils, however, are harsh in use, and their marks cannot be entirely erased.

Green and Fahey, of Charlotte-street, Portman-place, exhibited folding drawing models in three series, illustrative of perspective, and the principles of light and shade, which will be found of service, both to master and pupil, in the elementary studies of art. J. E. Cook, of Greenock, exhibited prepared panel for amateur painting, which requires but a day or two to be ready for the artist. Mr. Cook is deserving of much praise for this attempt to give facilities for obtaining material to the young beginner, who is too often cramped for the want of the necessary funds. It is related of Wilkie, that, by partly pulling out a drawer from a set, he made himself an efficient easel; and of Sir Benjamin West, that he obtained his first brushes by taking the hair off the tail of a favourite cat. F. Harvey, of Oxford, showed an easel for artists sketching out of doors, containing everything required. This is a judicious arrangement of materials, and one hitherto much wanted. We trust, it will not be long ere greater activity be given to the trade of which Mr. Harvey is a member, by the appointment of professorships of painting, sculpture, and architecture, at our universities. Why should not the youth of England, in their more docile years, acquire a taste for, and a love of art, the more as they are, in after life, to become patrons, and sit in learned conclave at committees of taste upon the merits of the rival works of the greatest men of their day. It would tend greatly to rescue them from egg-throwing and chicken-hazard, and other low and frivolous pursuits, too often the resource of those who have nothing to do, rather than the offspring of innate vice. The sister arts have their professorships; why, then, should painting be driven from the seats of learning? E. F. Watson, of Piccadilly, sent some excellent specimens of gilding, which contrasted strangely with the cheap gold frames around. There are few artists but are aware how much their productions depend upon the frame by which they are surrounded; and while a picture shall appear surpassingly beautiful in one frame, it shall seem poor and ill-conditioned in another.

It may here be remarked, that the "cheap" frames, now so much in vogue, which meet us at every turn, are the dearest the artist can purchase. The yellow preparation of their groundwork, but once, and barely, covered with gold (and that "gold" too often of a spurious Dutch character), peers through in unutterable poverty of aspect upon the slightest contact or friction, while the warmth of a room creates gaping crevices at each juncture, and cracks and shrivels the composition ornaments as though they consciously shrunk from contact with the green wood and its shabby disguise, upon which they had been so unceremoniously placed.

J. W. Gear exhibited a composition to supersede ivory for large water-colour paintings. The inventor, who is likewise an artist, informs us that it can be manufactured of any requisite size without a join; the colours, he adds, appear brilliant and clear upon it; and, as it is capable of being used in every respect as ivory, without the brittleness of other substitutes, it will be found deserving at least of the attention of the artist. We have no other means of judging of its merits than by the single sample shown in the Exhibition, which, being completely covered with a drawing of but average talent, denied us all opportunity of doing more than quote its discoverer's book. This and similar inventions to supersede ivory, which *once* could only be obtained of a limited size, however praiseworthy, are, where this is the object, no longer of importance, as ivory, by rotatory motion and fixed vertical saws, can now be cut into sheets of almost any extent. This observation will, therefore, apply to Sir W. Newton, who contributed several miniature paintings of his own, to exemplify a power he possesses in secret of "joining ivory together without the seam becoming apparent." These specimens were, however, unfortunately selected for the purpose. The seams, to our eye, *were* apparent, and more particularly in that of "The Homage," where a join ran the full length and breadth of the picture, in defiance of the thick and heavy "handling," obviously intended to hide it.

In Class 2, amongst the "Chemicals," was an exceedingly interesting case from the firm of Messrs. Winsor and Newton, of Rathbone-place. It is well known in the profession that these exhibitors are essentially practical men, and have very extensive chemical works for artists' colours in the neighbourhood of Kentish Town.

In No. 1, Class 17, a somewhat dark place, was a selection of fancy stationery from the old-established house of Ackermann and Co., of the Strand. Amongst it was a colour-box, fitted up with every requisite the amateur might desire; the whole arranged with great elegance and taste. Mr. Grundy, of Manchester, exhibited, in Class 26, No. 121, some very beautiful specimens of frames, intended to display, to the best advantage, fine engravings, drawings, and other works of art, and adapting them for the tasteful embellishment of the drawing-room, boudoir, &c. Those for drawings were exquisitely beautiful; and by a simple contrivance the works were sunk or inlaid in the *matte*, or mounting, which preserved them from injury, while they were likewise kept perfectly flat, and did not touch the glass. The frames were altogether lighter than usual, took up less space upon the walls, and had a charming appearance when relieved by a buff or scarlet ground. Water-colour drawings, and the lighter descriptions of oil-paintings, are surprisingly benefited by this ornamentation, while prints appear to be very considerably enhanced in value by such means. The new method of mounting water-colour and other drawings, without cutting their edges, we believe, is due to Mr. Grundy; and the advantage of placing them beneath, instead of above, the card-board, &c., owes its origin to his brother, of Regent-street.

The exclusion of the painter's art from participation in the scheme of the Great Exhibition, was an error of judgment on the part of the commissioners, which it seems utterly impossible to account for. At a time when the application of decoration upon the true principles of design is being attempted, under the auspices of government com-

mittees, not only in the palaces of the nation and the houses of the great, but also in the more humble abodes of the middle classes (through the operation of schools of design) —at a time when furniture, dress, and utensils for the table, all come in for a share of the improved taste of an age ambitious in art, it seemed an act of fatuity, when preparing a Grand Exposition of the Works of Industry of all Nations, to have excluded from the lists that very branch of art which affords the highest resources for decoration, as well as the most abundant and varied examples both of composition and colouring. The assiduity and interest with which the thousands who thronged to the Exhibition in Hyde-park examined the miscellaneous contributions of sculpture from all nations, must assure us that the masses are susceptible of enjoyment from the contemplation of works of fine art; and although many of the specimens there presented to them fell far short of the standard of excellence, and although the impromptu criticisms of the multitude by no means evinced an advanced taste, yet we feel so much confidence in the ultimate triumph of truth, which in art is beauty, that we are inclined to look for good practical results even from this scrambling course of self-education, amid a sort of wilderness of wild flowers. And if good so result from observations on sculpture obtained in this way, by millions who never saw a work of sculpture before, how much more useful to them would be some notion of the principles and practice of painting, involving both composition and colouring—an art much more intimately and generally applicable to the purposes and requirements of social life—and if a comparison by the more critical portion of the community of the works, we can hardly venture to say the schools, of sculpture of various nations, be interesting and instructive, would not a similar comparison of works of painting be at least equally so? The importance of such a comparison to English art it would be impossible to over-rate, when we reflect upon the comparatively short and chequered career which art, since its revival, has had in this country. It is scarcely more than a century and-a-half that art has held any position amongst us; since Sir James Thornhill, starting in rivalry to La Guerre, the favourite decorator of the mansions of the nobility of that day, received a commission from the state to paint the interior of St. Paul's Cathedral and the hall of Greenwich Hospital, in which he was assisted by a German named André, and which he contracted to do at the rate of £2 per square yard! It is not a century since the first attempt to establish an academy of art was made, inaugurated by the learned and admirable discourses of Sir Joshua Reynolds; and in the course of that period, what have we done towards the formation of a school of art? what definite purpose or rules of taste have we arrived at? The answer to these questions must be given by a silent and significant pointing to the walls of the various exhibition rooms in Trafalgar-square, Suffolk-street, and Pall Mall, where all has long been caprice, and glitter, and wild confusion, and where now a portion of our exhibitants seem to seek for unity of purpose, by devoting their pencils to a miserable copyism of the poorest mediæval models. Thus, whilst in little more than two centuries (Giotto died in 1336, Raffaelle in 1520), revived art in Italy arrived at its highest point of excellence and power under a Raffaelle, who founded a school which, in the persons of a Giulio Romano, a Garofalo, and a Parmegiano, survived some time after him—in England, in about the same period, after various unconcerted efforts, and fostered by much indiscriminating patronage, we find art, having never once attempted a flight of the highest ambition, degenerating at once into the stiff and inanimate mannerism of the twelfth and thirteenth centuries.

There is no hope of remedy for such a state of things, but in wholesome exposure in the broad daylight of public scrutiny. We must meet extravagance with extravagance; and native affectation being confronted by conceits from abroad (where there is much of the same error to complain of), shame and mutual ridicule may correct much; whilst

the strong arm of criticism and the loud voice of popular condemnation will do the rest. But it is not only to an exhibition of modern art of all nations that we should have looked as the means of educating the public taste. The vast avenues of the Crystal Palace, which might, without much trouble, have been prepared for the purpose, would have afforded an admirable opportunity for forming an exhibition of bygone art, arranged in order of schools; an exhibition of the highest interest and utility, which, from the nature of circumstances, has never yet been carried into effect, and for which the spacious resources of the World's Fair in Hyde-park afforded the first, we trust not the last, opportunity. Of the forthcoming of the necessary materials for furnishing such an exhibition, we cannot entertain a doubt, had the opportunity been afforded, seeing the alacrity with which foreign potentates, and our own most gracious sovereign and her consort freely sent in the costliest articles of jewellery and *vertù* in their possession, to enhance the attraction of the Exhibition; and how their example was followed by wealthy public companies, by noblemen and private gentlemen, each anxious to contribute their or his mite to the general splendour, but who, we are convinced, would have been far more proud to have shown a Raffaelle or a Rembrandt, than a "jewelled hawk" or a necklace once the property of the poor King of Kandy; and the public—the more intellectual portion of it—would have been much more obliged to them for such contributions, and the men of art, and the men of taste of all Europe, would have thanked them for helping to make up a show of precious worth and enduring interest, the recollection of which would have served to light their paths during a life of toil and study in the pursuit of excellence and beauty in art.

It is useless to enlarge upon the practical advantages and the intellectual charm of such an exhibition; it was denied us: and although a department in the Crystal Palace was named the "Fine Arts Court," the very existence of such a compartment was a mockery when coupled with the announcement that—Oil paintings and water-colour paintings, frescoes, drawings, and engravings, were not to be admitted, except as illustrations or examples of materials and processes employed, neither were portrait busts to be admitted; and no single artist was allowed to exhibit more than three works. It is true that this regulation was not very clearly worded, and that it might have been evaded, as all ill-advised and purposeless laws generally may be. Indeed, we could mention several publishing houses who managed to gain admission for a variety of engravings and water-coloured drawings. But still the general object of the rule was effected, and the Fine Arts' Court was crowded with very ordinary terra cotta casts, including brick-coloured and by no means delicately treated nymphs of heavy proportions, wax models, wax flowers, nicknackeries in colour-printing, and fancy stationery; card models of houses and gardens, dolls dressed in court and other costume, eggshells carved and engraved with fancy views, models in willow-wood, models in paper, and every conceivable absurd toy which could enter into the conception of a boarding-school miss, and which rendered this department, as far as it went, a positive blot upon the otherwise fair face of the Great Industrial Exhibition of all Nations. And it was really curious to see the shifts which poor Art, being excluded under its ordinary forms, managed to represent itself in the Great Congress of Industry, and what inconsistencies and waste of space this led to. Although "oil painting and water-colour painting, fresco, drawing, and engraving," had been declared inadmissible in their general sense—that is, in their best and noblest performances—the pictorial genius of Europe manifested itself abundantly on all sides in almost every conceivable material but the prohibited canvass; upon porcelain, from France, from Vienna, from Milan, from Dresden; upon glass from Berlin and other parts of Germany; upon tin from Wirtemburg; upon plate-iron from Thuringia. Then we had mosaics from Rome not a few, and beautiful of their kind; and from Munich

we had a collection of "stereochromic" pictures, executed upon wood covered with mortar, "a process intended as a substitute for the (prohibited) fresco-painting." Sir William Newton was allowed wall-room for several pictures upon ivory, representing "The Homage at the Coronation," "The Marriage of her Majesty," the "Christening of the Prince of Wales," &c.; but their reception in his case may, perhaps, be explained by the announcement that the ivory in these works was "joined together by a process of his own invention." Mr. Haslem and Mr. Bone had some enamel pictures in gold—many of them royal portraits, others copies from old masters; and Mr. Essex showed "an extensive collection of enamel paintings," copies from works in royal and noble collections, In short, whilst High Art was rigorously excluded, Little Art was greatly favoured. As to the prohibition of engravings, it was impossible to carry it out; and accordingly we found whole shop-loads of them in various styles in different parts of the building, some framed, others loose. In addition, we were startled, here and there, with some wonderful imitations of engravings, and pen and ink drawings, in silk, in human hair, in crape, &c.: which, as soon as the first impulse of curiosity was over, only left upon the mind of the spectator a feeling of disappointment and irritation.

Whilst upon the subject of simulative processes, we may refer to some "poker drawings," upon wood, by the Rev. W. C. Calvert, and some specimens of the art of "xulopyrography," or charred wood engraving, exhibited by Lieutenant C. Marshall and Mr. J. T. Mitchell, and which were entitled to rank in a higher category than the contrivances named at the close of the preceding paragraph. The latter productions were somewhat similar in appearance to old sepia drawings, and in their process of working had something in common with poker drawings. The difference between charred wood carvings, or engravings, and the said "poker drawings" was, that the former were cut from the surface of hard and white wood, which had been previously completely charred over, the lights and shadows being effected by scraping gradually away the black surface to the necessary depth, according to the shade required, going below where the burning extends for the absolute lights: whereas "poker drawings" are burnt on the surface of white wood, the lights being left and the shades burnt in. One of Mr. Mitchell's specimens was taken from a rare mezzotinto engraving by Prince Rupert, who, by the way, was long supposed to have been the inventor of the last-named process, though of this there is some doubt, it being probable that he learnt the art from Colonel Louis Von Siegan. The subject was "The Execution of St. John the Baptist," after Spagnoletti. The other specimen by this exhibitor was taken from Uwin's "Chapeau de Brigand" (in the Vernon collection. Lieutenant Marshall exhibited, we think, three or more of his works in this line, the most important of which was after Raffaelle's cartoon of "St. Paul Preaching."

A small picture ("the Origin of the Quarrel of the Guelphs and the Ghibellines"), by F. R. Pickersgill, A.R.A., was also admitted, not as a specimen of art, but of Rowney's silica colours, in which it was painted. Besides this, we had one or two other specimens of a like kind, and exhibited for a like purpose; as, for instance, two of Concannon's new method of aërial tinting by calcined colours, and some designs in the crayons and chalks of some other manufacturer, whose name we have forgotten. Beneath these, and some other gaudier displays of colours, rainbow or prism fashion, were ranged the brushes, palettes, and other implements necessary for using them; and so complete and instructive was this exposition of art requirements considered by Mr. Rowney, one of the exhibitors, that he placed a little plaster group, entitled "Letting the Cat out of the Bag," in the midst of his compartment, as much as to say that the mysteries of the craft existed no longer, and that amateurs might all be artists, if they pleased to lay in a stock of the necessary materials. In Mr. Ackermann's department we were agreeably struck with a very elegant colour-box, made of papier maché.

The above flying notes, though unimportant in themselves, may be interesting some future day, as affording a notion of the position held by the Fine Arts in the Great Exhibition of Industry of All Nations of 1851.

CHAPTER XXII.

CUTLERY—*From the Juries' Report.*

VARIOUS CONTRIBUTIONS—ENGLAND—FRANCE—BELGIUM—THE ZOLLVEREIN—AUSTRIA—RUSSIA—SWITZERLAND—SUPERIORITY OF ENGLAND—SHEFFIELD CUTLERY—INDIAN TOOLS—SPAIN—PORTUGAL—TURKEY—EGYPT—TUNIS—CHINA—AMERICA.

It appeared, according to the information laid before the jury, that there were, altogether, about 368 exhibitors in this class, distributed, very unequally, among twenty-two of the geographical divisions contained in the official catalogue. The United Kingdom, as was to be expected, furnished a proportion amounting to not less than forty-five per cent. of the whole list; and among these were to be found many contributors, on so extensive and varied a scale, that its share in the total display of these articles was much larger than the above numbers would imply. The second place was occupied by Austria, whose exhibitors constituted twenty-seven per cent. of the entire sum. After her the Zollverein States of Germany furnished about eight per cent., France about three per cent., Sweden and Norway in nearly the same proportion. A very small number of exhibitors from the remaining countries completed the list, though some of these national collections, however confined to few individuals, contained objects well worthy of attention. These results must not be taken as any certain indication of the comparative proficiency of the respective countries in the production of commodities of this kind, or of the value of their contributions. It is probable that, in some degree, they might have shown the character and nature of the manufacture as carried on in these different states, and corresponded with its subdivision among more or less numerous hands in comparison with its total extent. In Austria, for instance, we found by the catalogue, that the collections specified as assignable to each exhibitor consisted, for the most part, of one kind of manufactured article, scarcely any of more than two or three; and we might, therefore, perhaps venture to infer that the high number of these, as compared with some departments where they were individually more comprehensive, arose from a very different distribution of capital among their separate establishments in this branch of industry. But this is not to be considered as a disparagement to their contributions. Such a condition of the manufacture may be best adapted to the supply of the particular demand for which it exists; and, as regards the late Exhbition, even apart from such considerations, the appearance of a numerous list of exhibitors from any one country might have been reasonably taken as a gratifying evidence of the interest and activity awakened there by the invitation to co-operate in a display of the works of universal industry, and of an active desire to share in its honours. The characteristics of the different national collections were, however, interesting in more than one point of view. We detected, in various instances, indications of the peculiar condition and habits of the people whence they came, of their social and industrial wants and aims, as well as of their natural or acquired advantages.

In England, the close proximity of coal and iron, together with abundant facilities

for converting the latter into steel, gave, at an early epoch, to this branch of its manufactures, remarkable energy and importance. Its steel wares had a wide-spread reputation even in the middle ages. The authority of Chaucer assures us that, in the fourteenth century, the "Sheffield whittle" was an article of choice estimation; and, within their respective sphere, the blades of Toledo and Damascus were scarcely more valued than the more homely cutlery of England. This pre-eminence, the jury had no hesitation in pronouncing, she retained to a very remarkable degree in the late exhibition; though the general statement must now admit of modification, and it would be untrue and unfair to make it without adding, that she had, in certain branches of the manufacture, some formidable rivals. Still, the long-established trade of this country in steel goods of every description, and her ancient practice of forging them for the supply of all markets, were shown in the great variety, as well as excellence, of her contributions, which comprised specimens of almost every conceivable article of this description. But in other countries, where the manufacture has been of more recent growth, it is evident that the energies of their artizans have been directed, by a natural consequence, to the production of those particular articles more especially called for by their individual position or exigencies. One of the chief objects of the German Customs' Union, for instance, has been to encourage the supply from their own workshops of those commodities of general and ordinary use, which were formerly in great part derived from importation. From the Zollverein states, accordingly, we found a mixed collection of that character, together with some few objects of the plainer kind for certain foreign markets. From Austria, where the mines and manufactures are in the immediate neighbourhood of a large agricultural and pastoral population, it was observed that the collection consisted chiefly of scythes, sickles, and the simpler implements of husbandry. In Switzerland, the traditional manufacture of fine watch-work renders delicate files a matter of primary necessity, and there was, therefore, a predominance of these among the better articles in that department. The Belgian collection was distinguished by "spiral cutters" of superior quality, required in the finishing of the woollen fabrics for which that country has long been famous. In France, we of course found a very miscellaneous collection; but it displayed, in a marked manner, productions, indicating on the one hand the highest scale of social civilization and of manufacturing skill in certain spheres and localities; and, on the other, the simplest wants of a primitive provincial population; while in the United States and Canada, where the occupation of the population is an incessant war upon the forest, the manufacture of axes and woodmen's implements assumes an importance which has raised them to the highest perfection, and which rendered this class the most perfect part of the transatlantic exhibition. But it appears advisable to add some more precise notices of the peculiar contents of each national collection; and for this purpose it will be most convenient to take the two great divisions in the order adopted in the official catalogue.

First, then, with respect to the United Kingdom, we found that articles in the class of cutlery and edge-tools had been sent from a great variety of places. In England, from London, Sheffield, Birmingham, Warrington, Stourbridge, and a few other towns of less note; from Glasgow and Edinburgh, but chiefly from the former, in Scotland; and from Cork, Clonmel, and Limerick, in Ireland. Among these seats of the manufacture there was none, as might naturally be expected, which for extent, variety, and excellence of collection, could compare with Sheffield—its most ancient home. We here found every article, from the most exquisite razor down to the plainest pocket-knife, and from the finest saw or file to the most ordinary chisel displayed—with various degrees of merit, it is true, but with a large proportion of the highest. From this collection, the jury thought themselves justified in awarding, for one remarkable object, a council medal. Messrs.

Spear and Jackson exhibited, among an assortment of edge-tools of great excellence, a cast-steel circular saw, of the large size of five feet diameter, and of such signal beauty and perfection, that it stood far above comparison with any other in the building. The mere excellence of its quality and workmanship, however, would not, the jury declared, have enabled them to distinguish it by a council medal, if they had not been able to satisfy themselves that its merit was the result of a new and peculiar process of manufacture. But they entertained no doubt, from the information they received, that mechanical ingenuity of a novel and special character had been employed by these manufacturers for the production of such articles, without which they could not have been carried to equal perfection; and they therefore considered them justly entitled to the highest mark of distinction.

There were two other contributions to which the jury would have felt themselves called upon to award a similar honour, if they had been at liberty to regard singular excellence of workmanship and quality as of itself a sufficient title. Messrs. Turton and Sons, of Sheffield, and Messrs. Stubbs, of Warrington, each displayed a complete assortment of files of various sizes—the former for ordinary manufacturing purposes; the latter for the finer operations of the watchmaker—which, the one for large dimensions, and the other for minute delicacy, combined with the utmost strength and efficiency of material, far surpassed any other objects of the same class. They would have deserved the highest assignable reward in respect of these points of merit. Prize medals, however, were awarded to them in common with a number of associates not unworthy of their company. It will be found that the list of these contains a series of names of which many are of high note in the estimation of the public, and whose contributions—some extensive, and comprising, in a high degree, almost every variety of excellence, others limited, but of marked merit throughout—displayed the choicest productions in the most finished cutlery, and the finest mechanical tools.

The attention of the jury was particularly called to one novelty exhibited by Messrs. Blake and Parkin, of Sheffield, consisting of the union of two qualities of cast steel, hard and soft, in the same article; having carefully examined these specimens, which were manufactured with much skill, they saw no reason to doubt that the process was peculiar to the exhibitors; but they could not satisfy themselves that it involved any clear advantage over the combinations of cast and bar steel, and of cast steel and iron, the methods of cementing which have been long known and practised. The contribution from London was, of course, on a more limited scale than that from Sheffield; but it consisted of that superior order of cutlery for which the metropolis has a long-established reputation, and contained articles of high merit in this class. Among the exhibitors from London, Mr. Durham, of Oxford-street, would have been considered by his colleagues deserving of a prize medal, if his consent to act as a juror had not disqualified him from accepting it. The finer descriptions of cutlery were nearly confined, in England, to the Sheffield and London departments; but there were a few articles contributed by individual manufacturers from other places, whose names may be found in the award list; and there were some also furnished from Ireland and Scotland, which, though not equal to the best from the chief seats of the manufacture, were still of considerable excellence.

Manufacturing tools were supplied largely from Birmingham, and sparingly from Scotland; scythes and files from Stourbridge and Warrington; which latter place furnished the beautiful collection of watch-files by Messrs. Stubbs, already mentioned. On the whole, it appeared that the British manufacture of cutlery remains still, as heretofore, mainly seated at Sheffield, though it has been established also, to a limited extent, in some other quarters. The same gradual change of circumstances which has operated to transfer, in a great degree, the silk and some other trades from London to

the provinces, has had the effect of withdrawing much of this branch of industry from the capital; though a portion, chiefly directed to the production of the higher order of articles, still retains its footing there, and sustains its reputation. On the other hand, the manufacture of the coarser goods, such as tools and mechanical implements, is now extensively shared by several localities which afford the requisite facilities for its successful prosecution, and where the various other forms of industry which surround it create a continued demand for its productions.

Extending our survey beyond the limits of the United Kingdom, from its provinces to its dependencies, it was found that these presented aspects so very different, that certain distinctions were indispensable, with reference to a proper estimate of their position as exhibitors. It is not to be expected that in infant communities, such as most of the colonies, properly so called, a manufacture of this kind could have attained any considerable growth or perfection, though the greater progress and development of some few have enabled them to meet their peculiar local exigencies with considerable success. We found in this category a small contribution from the Cape of Good Hope, by the missionary station at Gnathendal, consisting of various forms of knives adapted to the uses of that country; and from Nova Scotia another, of cutlery made of Nova Scotia steel, though manufactured in Sheffield. Both were creditable to these colonies—while from Canada (West) there was a larger assortment, consisting entirely of axes and tools, the former especially of excellent quality, and proving the skill and power of her artisans to supply those particular articles to which her physical exigencies give the highest importance. On the other hand, there were contributions from dependencies which are to be considered in a very different light, not newly-peopled, but ancient communities, variously advanced in civilisation, and having their own established and characteristic industrial pursuits, often of the highest order of manual dexterity. In this division there were some from the vast territories of the East India Company, which well deserved notice; and a small contribution from Jersey. The Indian department contained various Hindoo and Malay tools for the use of carpenters and workers in metals; and among them were found, from Moorshedabad, in Bengal, a set of the implements employed by the native artificers in carving the beautiful ivory articles which have so long been admired in the western world, and which present such rare examples of ingenuity, taste, and skill. Articles of this kind, however, are of so peculiar a nature, and of so limited an application, that they can scarcely be considered as bringing into play any principle of general competition or comparison. It is not so with the foreign neighbours of Great Britain, whose productions come next under notice. They will be found to extend, with various degrees of excellence, through all the class of commodities which proceed from the workshops of the United Kingdom, and to include some, also, of a peculiar and distinctive character. Looking first to Europe, its foreign exhibitors might have been classed under certain great subdivisions, naturally suggested by the position and relations of its different members, and necessary to the clearness and convenience of the survey. Thus the several national departments contained in the total list might have been advantageously connected as follows:—

1. France, Belgium, and Switzerland. 2. Austria and the southern states of Germany. 3. The Zollverein and northern states. 4. Denmark, Sweden, and Norway. 5. Russia. 6. Spain and Portugal. 7. Turkey, Egypt, and Tunis. 8. China. 9. The United States of America, to complete the distribution over the remainder of the world.

1. From France there was an extensive assortment, ranging from the finest ornamental cutlery down to the rudest and cheapest articles for domestic use, which in general character was very good, and in some instances of superior quality. The greater portion appeared to be supplied from Paris; but there were a few exhibitors also from

the provinces—from Moulins (an ancient seat of this manufacture), from St. Etienne, and from places in the districts bordering on the Rhine.

In cutlery, the best specimens were those of razors, pen-knives, scissors, and table-knives, many of which were very highly finished and elaborately ornamented, and displayed great skill as well as superior quality. Among the tools and implements were to be found a very excellent circular saw, showing high proficiency in this branch of the manufacture, and assortments of files, also of considerable merit as to workmanship, though found, after a careful trial, to be not quite perfect as to the quality of the steel. On the other hand, we may mention particularly the samples of "web-saws," which were of the very highest class, and, indeed, superior to anything of the same description contained in the English collection. Belgium supplied cutlery, together with files, scythes, "ledger blades," and "spiral cutters." These last articles are portions of the machinery used in the dressing of cloth, and were of a high degree of merit. The cutlery, principally of the table kind, was well finished, but the metal was somewhat soft, and unequal to the workmanship. The same must be said of the scythes and files. From Switzerland, the articles consisted mainly of razors, and of small files adapted to the use of the watchmaker. The former were of fair quality; the latter of the most delicate workmanship, and well suited to the trade for which they were designed, and which has been long successfully pursued in that country. The attention of the jury was called, in the French department, to a collection of articles, as examples of remarkable cheapness, which they would not have deemed worthy of mention on any other grounds. These were a certain description of extremely rude pocket-knife, said to be in very universal use amongst the peasantry of France, for cutting their provisions and other purposes. They are formed of a rough blade of soft iron, folding into an equally rough turned cylindrical handle of wood. It is obvious that, with such materials, their utility must be very limited; but they are sold for five centimes, or about one halfpenny each, and are therefore in general use among the poorer classes. In France, Belgium, and Switzerland, the manufacture of cutlery and edge-tools has greatly improved, and seems likely to continue to do so.

2. Of the sub-division of states, which we have placed next in order, the same improvement was, to a considerable extent, observed. Including therein Austria, Wurtemberg, and Saxony, we found that the two latter, at least, exhibited specimens of general knife cutlery, and of hunting-knives, which, though they could not be pronounced equal to the best English, were of very good quality, well finished (especially in the Saxon portion), and mounted with much costly ornament. From Austria the display was not of so high a class; the cutlery from that country was of a very ordinary description, chiefly the produce of Styria, and was stated to be exhibited, in a great measure, as an example of cheapness. After such consideration, however, as the jury had the means of giving to this point, they concluded that the price was not below what goods of the same quality might be produced for in other countries. The articles were very deficient in merit of any other kind, many of them not even being of steel.

These remarks apply in a great measure to the tools and implements in this department. There were some from Wurtemberg of fair quality; but the assortments of files and other such objects from Austria were indifferent, and not, apparently, very low in price. There was here, however, one description of article deserving of notice, as a curious example of the modification which all tests of merit must undergo when judged by the peculiar uses for which the production is designed. We allude to assortments of scythes, from the southern provinces of Austria, worked thin, and with a concave surface, very difficult to forge, and therefore requiring much skill in the workmanship, but of metal so soft and inferior, that they would not have been considered worthy of any notice were

it not that they are so made purposely to suit the particular habits of an agricultural population, who mow all crops, whether of grain or other kinds, close to the surface of a soil generally abounding in stones. A scythe of hard steel, with a fine edge, though it might perform its work better where unimpeded, would be liable to constant injury, very difficult of repair, under such circumstances; whereas these Tyrolese or Styrian scythes yield at once to the blows which they receive upon their edge. The labourer carries with him a small hammer; and whenever the blade has so far lost its shape as to need renewal, he beats it out in a few moments to its original form; hence the softness of the metal, in most cases considered wholly inconsistent with excellence in this branch of manufacture, becomes an essential property.

3. From the States of the Zollverein, and from Hamburg and Mecklenburg-Schwerin, in Northern Germany, there was a collection of articles of almost every description. The two latter States contributed only on a limited scale; Mecklenburg some razors, and Hamburg also, together with a small collection of tools, of fair quality. The former commodities were not good of their kind, and those from Mecklenburg apparently very high in price. Of the cutlery from the Zollverein, much, though highly finished, was of an ordinary description, consisting of table and pocket knives in considerable variety; but there were also certain "spear knives," designed for fishing by the natives in the South American rivers, and adapted for their markets, which deserved notice as of superior manufacture. Among the tools the same character prevailed as in the cutlery, though there were certain "web-saws" which evinced higher skill. There was an assortment of scissors, chiefly from Solingen in West Prussia, worthy of attention as being manufactured in great numbers from an ore producing a "natural steel," which is of such quality as to suffice for the purpose to which it was here applied, and to save the manufacturer the cost and labour of the converting process, thereby enabling him to produce such goods at a price much lower than would be profitable with the ordinary methods. The workmanship of these scissors appeared to be fair; but the jury were unable, after much attention to the point, assisted by the judgment of Mr. Ragg, an experienced workman, to satisfy themselves entirely as to the real quality of the metal, although the material from which they were said to be manufactured had been examined by Mr. Henry, and was pronounced by him to be steel.

4. The collections from Denmark, Sweden, and Norway were small, and contained little that required notice. From the two latter countries the number of exhibitors bore a large proportion to the extent of the contributions, indicating establishments on a very limited scale; and although Sweden has long produced the most valuable iron, as the raw material of the finest steel and of the most finished cutlery, it does not appear that the manufacture itself has made any great advance. The collection consisted of some razors, spring-knives, and other cutlery tools of an ordinary kind. From Denmark there was one singular article, a set of files, hollowed, and made to fit within each other: they were curious, and difficult of manufacture, but of no apparent utility.

5. Of the three contributions from Russia, one only was from a private individual, the other two were from imperial establishments. The former contributed a varied assortment of cutlery of all kinds, and of fair quality; the latter some tools, which could not be ranked very high, and some scythes of the same kind as those whose peculiarities were described in the Austrian department. The Russian implements of this description were the best.

6. From Spain and Portugal the contributions were very small. The former exhibited only an assortment of files from Placenzia, of very fair quality; the latter, some "agricultural implements," consisting of pruning-knives and scissors, probably adapted to the vine cultivation, but of little merit as manufactured goods.

7. Of the three States in the next division, Turkey, Egypt, and Tunis, the two latter were only slender contributors in this class. One or two articles contained in the list furnished by the Egyptian government, and a few pairs of Tunisian scissors of the roughest workmanship, constituted the entire collections. Turkey, however, appeared with articles of greater interest, such as scissors and hunting-knives, few in number, but well made. The knives had blades of Damascus steel; the scissors were of a singular form, and well deserved notice. They were so fashioned that each blade was half of a hollow cone, and the two therefore produced an entire cone when closed. The sides of each of these halves formed the cutting edges. They were well finished, and must have required much skill and great labour in their fabrication, rendering their cost high; but it did not appear that they possessed any superior utility. It was not stated that they were so made for any special purpose; and, if not, they involve considerable waste of toil and skill.

8. From China there were only a very few articles; but one of them was a singular instrument, and should be noticed, as characteristic of the people from whose workshops it proceeded. It was a small blade of a triangular form, $2\frac{1}{2}$-in. long, $1\frac{1}{4}$-in. wide, and $\frac{1}{4}$-in. thick, folding upon a slender wooden cylindrical handle, and was used as a razor for shaving a part of the head, according to general practice among the Chinese. It is not easy for us to comprehend how the operation can be successfully performed with such an implement; but it is said to be in common use among the natives, and to effect its purpose in their hands with the utmost nicety and dispatch, and it cannot, therefore, be ill-adapted to its object. The workmanship was, to European eyes, of a very rude description, and even the surface of the metal displayed none of the finish which was so diligently bestowed on many Chinese productions; but the edge it carried was certainly good, and its quality, no doubt, surpassed its appearance.

9. Lastly, the opposite hemisphere supplied, from the United States of America, a collection which, though not very extensive, contained some signal proofs of proficiency in such manufactures, and was strongly characteristic of the natural and social exigencies of the people from whom it came. It consisted of a few articles of the finer cutlery, but mainly of assortments of the larger edge-tools and implements, such as scythes and axes, and other objects of that nature. The former were finished with great care, and decorated with much costly ornament; but the jury could not pronounce them to be of the first degree of excellence in workmanship, and their temper was wanting in the hardness proper to the best cutlery. With respect to the other articles, however, the case was different. There was a set of joiner's tools, which, though few in number, were excellent; and the same might be said of the scythes, which were of the best quality. Good as these productions were, they were, perhaps, surpassed by the axes, to which nothing of the kind could be superior. They were admirably finished, and at the same time displayed all those more valuable qualities which are the necessary conditions and evidence of perfection in such commodities. It was evident that the great prevailing want of the population had created and encouraged to perfection, in its own neighbourhood, the trade which was to supply it. The jury believe, that in the above general survey of the contributions presented by this class of the Exhibition, they have left nothing unmentioned of any note or merit.

CHAPTER XXIII.

HARDWARE.

PINS, EDDELSTON AND WILLIAMS—KIRBY, BEARD AND CO.—GOODMAN, ETC.—SHEFFIELD MANUFACTURES—SPRING KNIVES, ETC.—BRILLIANT TROPHY—GAS BURNERS, STOVES, ETC.—ELECTRO-PLATING—METALLIC PENS—BUTTONS.

THE limits assigned to the display of articles of hardware were necessarily occupied by an extensive and miscellaneous collection, embracing the most minute as well as the most gigantic of manufactured articles; from the delicately formed tiny ribbon pin, to the ponderous and unwieldy anchor; from the commonest implement of domestic utility, to the monster engine of destruction, the enormous cannon exhibited by the Low Moor ironworks. What wonders might there not be revealed, had we time for entering minutely into the subject, in the description of the various modes of manufacture, and the no less various uses of the numerous articles that were ranged under the title of this chapter? We shall briefly notice a few of the most serviceable appliances to the requirements of civilised man; and, as "*ex pede Herçulem*" is our motto, for the present we shall commence with the apparently insignificant article of "pins," as illustrated in the Great Industrial Exhibition of 1851. The number of exhibitors of pins was very limited. In the Birmingham compartment there were but two—Messrs. Eddelston and Williams, and Mr. Goodman; Messrs. Kirby, Beard, and Co., exhibiting in the north transept gallery: and it was a matter of regret that in the machinery department none of the mechanism by which pins are made was exhibited. After examining the finish and form of the pins in the collection of Messrs. Eddelston and Williams, we cannot avoid being struck with the immense advance which must have been made since the time of Queen Elizabeth, when wooden skewers formed an indispensable adjunct to her Majesty's toilet table. Even during the last twenty years the improvements have been very considerable. Previously to that time the head of the pin consisted of a spiral ring of wire, placed upon the shank or shaft of the pin, and fastened to it by blows of the hammer. The inconvenience which resulted from the heads becoming loose led to the adoption of a plan, now very general, for making pins with solid heads. Messrs. Eddelston and Co. exhibited a series of examples, showing the various processes which a pin undergoes in its progress towards completion. We first saw a small block of copper and one of spelter; next to these there was a block of brass, formed of the union of those two metals. These blocks were then shown cut into smaller flat strips—then partially drawn—and finally drawn out into different thicknesses of wire. The wire was next seen cut into the required lengths, in the form of "pin blanks"—afterwards "pointed" and "headed"—and finally, the silvered or finished pin. A pair of dies and a punch, used in forming the head of the pin, were also shown. By means of this instrument or machine the pin was formed, complete with the head and shaft, out of one solid piece of wire, instead of by the old process of the wire heads. The solid-headed pin was invented by Messrs. Taylor and Co. about twenty years since, and was patented by them, but the patent has now expired. In order to produce the head, the shaft of the pin is cut a trifle longer than the finished pin is required to be made. The wire thus cut passes into a mould of the exact length of the pin, and the end of the wire projecting beyond the length of the mould, is by a sharp blow flattened, and shaped into the form required for the head. The heads are afterwards burnished, an operation which adds greatly to their finished appearance. The finished pins we observed were most

tastefully arranged around a centre, being of all sizes, from the large blanket-pin, of three inches in lengths to the smallest ribbon pin used by the ribbon manufacturers, of which 300,000 weigh only one pound. The collection of insect pins used by entomologists was worthy of attention, as showing what minute specimens may be produced by the aid of machinery. They are made of much finer wire than the ordinary pin, and vary in length from two to three inches to a size considerably smaller than the tiny ribbon pin. Some smooth elastic hair pins, highly approved of by the fair sex, and of which some tons weight are annually made by Messrs. Eddelston, were also shown in their case. The smoothness of the wire, and its fineness and elasticity, are certainly most surprising. In connection with the manufacture of the solid-headed pins it is a curious fact, that although so vastly superior to the old-fashioned pin, they are produced at a considerably less price, in consequence of the great perfection of the machinery employed. In addition to the improvements made in the heads, machines have recently been constructed by the firm, each of which is capable of pointing pins at the rate of upwards of six hundred per minute. These and various other improvements in the process of manufacture enable the makers to sell the great majority of the pins at the merest trifle over and above the cost of the raw metal; a large number of the pins manufactured being sold at not more than twopence per pound over the cost of the metal of which they are formed. Upwards of 200 hands are constantly employed by Messrs. Eddelston in this branch of manufacture; and the number of pins made by them is, in consequence of the improved machinery, more than three times that which could be produced by the same number of workmen only a few years since. Upwards of 150 tons weight of copper and spelter are annually worked up into pins by this one Birmingham house alone. Were the whole of the metal which is worked up during the year, in this one manufactory, converted into ribbon-pins, half an inch in length, it would produce the enormous number of 100,800,000,000, or about 100 to each inhabitant of the globe. If placed in a straight line, they would be 787,500 miles in length, or sufficient to extend upwards of thirty times round the globe, or more than three times the distance of the moon from the earth. Some idea may be formed from these figures, not only of the extraordinary malleability of the metal, but of the astonishing consumption of the articles formed from it. Indeed, we can scarcely conceive any question more completely unanswerable than that of "What becomes of all the pins made?"

Messrs. Kirby, Beard, and Co. made an interesting display of pins in their stand; the back of which was ornamented with the words "Peace and Industry," and with various other decorations produced in steel beads, closely imitating the heads of pins. In the case itself were shown the pins in various stages of progress, and a large assortment of "toilet," "hatters'," "jet," "ribbon," and "milliners'" pins. Mr. Goodman, of Birmingham, and Mr. Chambers and Mr. James, of Redditch, also exhibited a variety of pins, which, so far as we were enabled to judge of them in the case, were well-finished specimens. In the machinery department was shown an ingenious and interesting machine, by Mr. Iles, of Bardesley Works, Birmingham, used for sticking pins in circular tablets. We may add that Messrs. Eddelston and Co. have since constructed a machine, by which they are enabled to stick the pins upon the papers upon which they are sold, and which performs its work with marvellous rapidity and accuracy. M. Reineker, of Cologne, in the Zollverein division, showed several varieties of pins: some with composition metal heads, cast in the same mode as shot, with a hole in the centre and secured to the shaft. Samples of iron wire in hanks with a coating of copper, were also shown in the neighbourhood of the finished article. The pin manufacture of Austria was represented by M. Struntz, of Vienna; and M. Vantillard, of Mérouvel, France, showed some specimens of iron pins, tinned by a process recently patented both in France and England.

Sheffield Manufactures.—The conversion of iron into steel, (to the extent of many thousand tons annually,) is the principal manufacture of Sheffield; and the several processes of cementation, blistering, shearing, casting, tilting, and tempering, were illustrated by specimens in the Exhibition. Thus Messrs. Johnson, Cammell and Co., of the Cyclops Works, exhibited progressive specimens, from the imported iron up to the most refined state of the metal—in the varieties of "cemented blister," "double-refined cast," "double-shear," or "elastic spring." Their display of tools included their "curvilinear tanged file;" and their "continuous tooth concave and convex file;" the latter rewarded by a medal from the Society of Arts. The careful finish of their work was also shown in their springs for railway carriages; and in a piston-rod, weighing 16 cwt., the finest and largest piece of steel in the Exhibition. Another assortment, forwarded by Turton and Son, illustrated steel manufacture from Swedish bar-iron. The same firm contributed a steel ingot, weighing upwards of 1 ton 4 cwt., intended for one of a pair of piston-rods for a marine engine. It consisted of the contents of 48 crucibles, each charged twice with 80lb. weight of steel; the operation was performed by forty work-people, and the pouring of the melted liquid steel into the mould was accomplished by three men in eight minutes.

Messrs. Turner and Co. displayed a pair of Albert venison-carvers, with stag antlers; and the Prince of Wales's sailor's knife. We must not, however, omit to record a brilliant trophy of Sheffield cutlery, which was arranged in a case in the western nave of the building. It contained 230 pairs of scissors, of every size and pattern, grouped and mounted upon a white ground; the centre object being a pair of huge scissors, twenty-two inches long, the bows and shanks representing in outline two crowns; the upper one surmounted by a thistle: all the ornamental work was wrought with the file, some portions of the surface being chased. This object was by far the most expensive pair of scissors ever produced in Sheffield. On each side of this appeared another pair, nearly the same size, and scarcely less beautiful or costly. One pair represented, in chasing, the bruising of the serpent's head; in the centre was wrought out with the file the Prince of Wales's feathers; and the bow was the shamrock, rose, and thistle, and scrollwork—all wrought out with the file. Next was illustrated the scissors' manufacture, in its ten stages. Among the most striking specimens was a pair of 16-inch fancy nail-scissors, ornamented with etching; a group of surgeon's scissors, curved, angular, and distorted for difficult operations: a sportsman's knife, containing eighty blades, and other instruments; also one three-quarters of an inch long, with fifty-one blades and other instruments; and a case containing twelve perfect pairs of scissors, yet so small that they did not weigh half a grain. Another striking feature was the variety of stoves; register and air, cooking and gas, heat-reflecting, smoke-curing, &c.

Among the gas-burners exhibited was the self-regulating apparatus, by Mr. Biddell, who introduced into the centre of the burner a vertical compound rod of about a quarter of an inch in diameter, the cylindrical case being of brass, and the core within of steel. By the expansion and contraction of this rod, which is surrounded by the flame, a small lever and simple valve, in connection with the bottom of the rod, are acted upon so delicately, that the exact amount of gas required to keep up uniformity of flame is preserved.

One exhibitor, who had great faith in a new name, sent a saucepan with a false bottom, upon which, potatoes being placed, covered up, and set upon the fire, steam was generated, and thus the potatoes were cooked in the water they contained—a contrivance called the *Anhydrohepsetereon.*

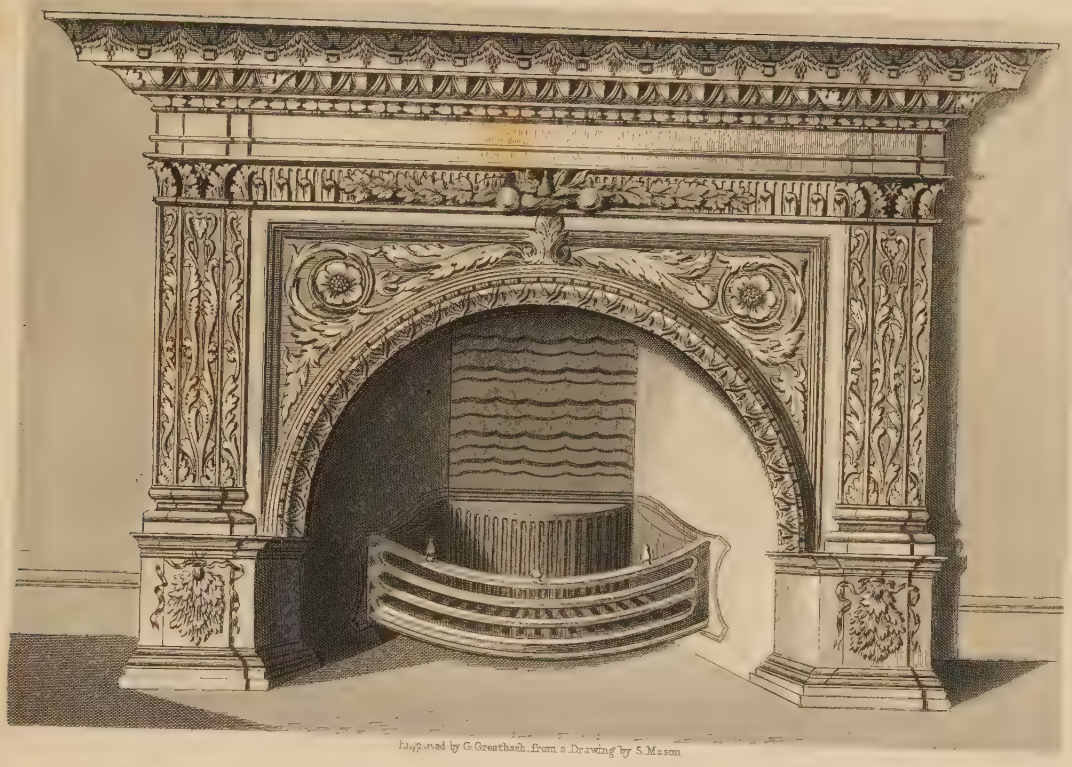
Dr. Arnott's stoves and ventilating apparatus were exhibited: with Peirce's pyropneumatic stove, made of fire-clay in pieces, through which are air-keys, the whole cased with iron; an open fire warms the fire-bricks, the passages between which are connected

with a pipe leading to the external air, when the warmed air rises into the apartments, and a supply of fresh air is obtained from without. Edwards's patent *Atmopyre* was shown: it consists of a porcelain chamber; within it is the gas fire, which escapes through minute perforations; the mass thus becomes red hot, or, in the words of the patentee, a "solid gas fire" cooking stove. Several gas meters were also shown here. The stove-grates tastefully displayed painted china and ormolu, encaustic tiles, gold medallions and scrollwork, marble and alabaster; and we learn from Mr. Hunt's excellent *Hand-Book*, that seven of these grates and six fenders had been designed by pupils of the government school. The fire-irons and fenders were also of corresponding elegance.

There were several specimens of patent wire ropes exhibited by Messrs. Newall; and of flat chains with wooden keys, for collieries, by Mr. Edge. Messrs. Henn and Bradley supplied a good assortment of their crown-tapered screws, of the most delicate structure, for pianofortes, as well as for the heaviest railway purposes.

Sheffield Plating.—Although the electro-plating process is extensively applied, Mr. J. G. A. Creswick, of Sheffield, states, in a letter to the *Times*, that the old and substantial method of plating on the ingot by fire is still employed in that town, and is almost entirely used in articles for the London trade—such as dishes and covers, tea-sets, candelabra, &c.; and in many cases such goods (made by the first class of the Sheffield manufacturers) have stood the wear of from twenty to thirty years' use. Mr. John Gray, of Billiter-square, exhibited a series of articles illustrative of this method of plating, commencing from the ingot and terminating in the finished article. The ingot is composed of copper alloyed with other metal, so as to impart to it the necessary roughness and rigidity. The plate of silver is tied upon its polished surface with wire, and the combined metals are then heated in a furnace, till both bodies are in a molten state, and thus become most effectually united. After this process, the two metals united form an ingot, which is subjected to rolling and hammering into form—which test the electro process never subjects articles to, as they are all coated after the goods are finished, so far as manipulation and annealing is concerned. Soldering the silver upon any baser metal is only practised in making cutlery, and does not at all apply to plated manufacture, being a distinct branch of business. Mr. Gray also exhibited an ingot of copper, previous to this process, with the plate of silver tied upon it with wire; ingots of copper and white metal after the silver plate has been united to them by an elevation of temperature only; and a sheet of plated metal, rolled from a plated ingot. A table-dish, made from the rolled metal, was the next in the series, with the silver mountings laid upon it, but not yet soldered. The steel dies in which the silver mountings are struck, together with the mountings produced by them, were also shown; in fine, the table-dish was exhibited in its finished state, as well as a specimen of a salver likewise produced by this manufacturer.

Metallic Pens.—A steel pen is as great a wonder of the present day as a pin was to our ancestors. Large black and red pens were made of steel early in the present century; but the extensive introduction of steel pens dates from 1828, when Mr. Gillott, of Birmingham, patented a machine for making them; and 1830, when Mr. Perry, of London, added to their flexibility "by apertures between the shoulder and the point." About the years 1820 and 1821, the first gross of three-slit pens was sold wholesale at 7*l.* 4*s.* the gross; the cheapest pens are now sold at *twopence* the gross, and the price rises with the elasticity and finish of the pen up to 3*s.* 6*d.* and 5*s.* the gross. Nearly 150 tons of steel are stated to be now annually made into pens; and, in one Birmingham establishment, 500 hands are daily employed. Here is an outline of the several stages of the manufacture. The rolled sheet steel being received from Sheffield, is cut into strips, put into cast-iron boxes and softened by heat, and rolled between metal cylinders to the required thickness. The steel is then passed to a woman, who, with a



Engraved by G. Greatbach, from a Drawing by S. Mason

STOVE, DESIGNED AND MANUFACTURED BY

MESSRS CARR & ROBERTSON, SHEFFIELD

THE NAUTILUS STOVE

hand-press, cuts out at a single blow the future pen; and a good hand will cut 28,000 per day of ten hours. The central hole and side slits are cut by another press; the semi-pens are then softened by heat, by a die worked by the foot—are stamped with the maker's name, and then by a machine pressed into a cylindrical form. The pens are again heated, and then thrown into oil, which makes them very brittle; but they are cleansed and restored to elasticity by placing them in a tin cylinder, turned over a fire, like a coffee-roaster; the pens are next scoured with sawdust, in cans placed in a frame which revolves by steam. Each pen is then ground at the back, in two ways, at right angles to each other, or rather over each other; the girl holding the pen with nippers for a moment on a revolving "bob." The pens are then slit with a tool very nicely fitted into a hand-press, turned by a handle. They are next examined and sorted; and lastly, varnished with lac dissolved in naptha, evaporated by heat. Messrs. Gillott's specimens ranged from a monster pen, weighing five pounds, and measuring one yard in length, to a Lilliputian weighing four grains; the monster containing metal enough to make 1,092,327 of the tiny ones: the colouring of the metal was very rich. In a glass case, too, the whole history of the manufacture was wonderfully told. In an adjoining case, by Wiley and Co., were shown silver and gold pens, some tipped with iridium and osmium, the hardest of known metals; and in Hinckes and Co.'s case was a series of nut-shells, each containing an incredible number of infinitesimal pens of great finish, which it required a microscope properly to appreciate. Messrs. Perry also exhibited some fine specimens.

Buttons.—The oldest of the Birmingham buttons seem to have been a plain flat button, of the waistcoat size, which, a hundred years ago, was sold at 4*s.* 6*d.* a gross, and which is still manufactured at 1*s.* 6*d.* a gross. Then came a very large button, of the size of half-a crown, with ornamental devices on it; but this was dear. It was the gilt and plated button, introduced between 1797 and 1800, which made the great "hit" in the trade. This button became immediately fashionable, and continued so for a quarter of a century. Everybody must remember the days when the blue coat, with its seemly array of glittering brass buttons, was the not unbecoming garb of a gentleman. At the end of twenty-five years, it was pushed from its popularity by the covered, or Florentine button; but some years ago a dashing attempt was made to revive its glories by means of a deputation which the trade despatched to London. We do not learn that they committed a similar inadventure to that of the poor wig-makers, who went up to petition the throne, some years previously, against the practice of wearing one's own hair—but, going in their own natural hair, so scandalised the mob by their inconsistency, that they had it all cut off for them by the rabble. Armed with sets of beautiful bright buttons, the discomfited makers forced their way to the foot of the throne, and, tendering their article, besought royalty to pity their misfortunes. They represented that the old button was very handsome, and that thousands were reduced to poverty by the introduction of the new one; and they therefore entreated the king (George IV.) to encourage the metal button trade by wearing that article. The same appeal was made to other influential persons; and not only the king, but the Duke of Clarence, several of the ministers, many members of the nobility, the Lord Mayor, and other notables, accepted the proffered buttons, and promised to wear them. The experiment was successful; a reaction took place, and the dark button, as we well remember, went aside for a few seasons. Again we all came out glittering—

"To midnight dances and the public show."

But the triumph was not long; and that it was not longer was the fault of the Birmingham people themselves. Some manufacturer invented or introduced a cheap

method of gilding the buttons. The trade called it French gilding, the workmen named it "slap-dash." It made the buttons look remarkably brilliant for a very little while, but they tarnished almost immediately, even before the retailers could sell them; and if placed in all their brightness on a new coat, they looked shabby in a fortnight. This discovery—perhaps it is refining too much to suppose that it was introduced by a friend to the Florentine button—fatally and finally damaged the metallic cause, by casting discredit upon the whole manufacture: people left off ordering brass buttons, and by 1840 the trade was again ruined. A second attempt at obtaining illustrious intervention was made: Prince Albert was assailed by a deputation, and the sympathies of the press were invoked by the metal buttonist. But the charm would not work twice, and you never see a gilt button now except upon the terribly high-collared coat of some terribly devoted adherent to old fashions, who may be observed nestling in the corner of the stage box on first nights, and who, if he speaks to you, is sure to growl out the unreasonable intimation, that "You ought to have seen Joe Munden, sir, in a character like this. Munden, sir, *was* an actor." Except the buttons required for the military and naval services, and for "Jeames," the metal article is out of date, and covered buttons have it all their own way. The Florentine or covered button was first introduced into Birmingham in 1820, and it derives its name from the Florentine cloth with which it is covered. It is composed of five pieces: first, the cover of Florentine cloth or silk; second, a disc of metal, which gives the shape to the button; third, a somewhat smaller disc of brown pasteboard or wadding; fourth, a disc of coarse black linen or calico; and fifth, a disc of metal, from which an inner circle has been punched out, so that the cloth or calico above may slightly protrude, and form a shank of the button. Young girls cut the various discs with a punching machine, and the last operation is to place the five pieces in regular order in a small machine constructed to hold them—an arrangement carried out by a number of little children under a woman's superintendence; and then this machine, which has been compared to a dice-box, is brought under a press, which, with a touch, fastens the whole bottom together with a neatness and a completeness to which any one who will examine his coat-button can be witness.

Horn buttons are made from the hoofs of horned cattle: those of horses are not available for the purpose. The hoofs are boiled until soft, and cut into halves; then "blanks" are punched out. The blanks are placed in vats containing a strong dye, red, green, or black, and the shank is next fixed in. The button is then placed in a mould, where the under surface is stamped with the maker's name. A dozen moulds are put into an iron box, and heated over an oven until the horn is as soft as wax, and then an upper mould with the pattern for the top of the button is pressed down, fitting close to the lower mould. The moulds having been placed in the press, and submitted to its action, the buttons are complete, except that the rough edges require paring. Brushes, worked by steam, then run over and polish the buttons, and they are ready for the sorter. There were numerous beautiful specimens of these buttons in the cases to which we shall presently refer. There are still many other kinds of buttons to be noted. The pearl button gives employment to 2,000 people in Birmingham alone. We must not forget glass buttons, with which it was lately the pleasure of admiring mothers to sprinkle their little boys very profusely, and which are also much in demand for exportation to the African chiefs, who have the true barbarian love of glitter. There are two sorts, the round and the knob-shaped. The former are made of sheet glass, of various colours, and coated with lead, which is cut by hand into small squares, the corners of which are rounded with scissors, and the edges are ground on a wheel. The shank is then fastened; it is joined to a round piece of zinc, the

size of the button, and soldered to it. The knob buttons are made in a mould: a long rod of glass being softened in a furnace and clasped in the mould, in which the shank has previously been fitted. The black glass buttons, for coat-links, are made at a lathe. Agate, cornelian, and stone buttons are imported from Bohemia, and shanked and finished in Birmingham. There were several other kinds of buttons, as the iron and brass buttons with four holes, used for trowsers, steel buttons for ladies' dresses, wooden buttons and bone buttons for under clothing. The former are punched by one press, rendered concave by another, and pierced by a third, and then a hand-piercer is introduced from the opposite side to that which receives the blow, in order to smooth the edges of the holes. Having been cleaned, the buttons receive a white coating, by means of a chemical process. The steel buttons are made by the steel toy manufacturers. The wood buttons are made by wood turners; and the bone buttons are chiefly made by the horn button makers.

Having thus enumerated the principal forms of buttons, we will pass in review some of the specimens exhibited. Messrs. Twigg had some very handsome specimens of the "Jeames" button, and some boldly embossed naval buttons, with appropriate ornaments. Some of their cut-glass buttons in metal were effective. Messrs. Pigott's bronzed buttons, with sporting subjects, were among the best we have ever seen: and Messrs. Hammond had some particularly bold and well-executed device-buttons—a set which we noticed, as made for a "curling club," being very characteristic. Messrs. Ashton not only showed a handsome assortment of all kinds, especially of the Florentine class, but they introduced a series designed to illustrate their manufacture—a course which was very much in conformity with the spirit of the Exhibition, and one which we could wish had been adopted wherever it was conveniently practicable. Messrs. Inman had also some bold and well-executed buttons, some of them honoured with the episcopal *insignia*, and others for the servants of the London Docks. Some of the prettiest cut-glass buttons in the Exhibition were those of Messrs. Neal and Tonks; and Messrs. Chatwin's case contained as highly-finished specimens as any assortment around them. In connexion with Mr. Banks's buttons, we observed some large and fine specimens of the shells used in the manufacture of pearl-buttons, above described, which were brought from the Gulf of Persia, and from the Sooloo Isles. A very small but pretty contribution was made by Mr. Knowles, consisting of gold plated and enamelled buttons: there were, we think, about a dozen only. Mr. Wells exhibited some horn buttons of considerable merit. A case contributed by Messrs. Smith, Kemp, and Wright, showed us a very brilliant assortment. The sporting buttons, representing the neck-and-neck end of a race, the hunter clearing a hedge, the sportsman bringing down his partridge, with other varieties of amusements, were very cleverly designed. There was a good St. George and the dragon, and indeed a very rich multiplicity of devices, enamels, crests, buildings, military and naval buttons, a capital lion, and other designs for ornamental buttons. Messrs. Allen and Moore, among many choice and beautiful articles in hardware, exhibited metal buttons of fine finish; and Mr. Ashton, showed velvet buttons, which we marked as very rich in their effect. We have spoken of the manufacture of pearl buttons, and Messrs. Elliott exhibited some with metallic rims—an arrangement which conveyed the desirable idea of exceeding care in the finish. Messrs. Ingram illustrated very fully the horn button in its history and varieties. Messrs. Heeley also had some metal articles amid their beautiful hardware. Mr. Nash, a die sinker, showed the dies by which the metal buttons were stamped. In a case exhibited by Mr. Brissrabb, were specimens of the mother-o'-pearl button, and among them some of the black pearl.

The general characteristics of the specimens of button manufacture must, of course be,

to a great extent, similar, the contributions having been chiefly sent by first-rate producers, who, in running an honourable race with their rivals, all attained the point of excellence, which left little room for diversity. In some of the cases there was more artistic taste, as regards the designs of ornament, than in others; but the mechanical finish of the whole array defied censure. The button manufacture of England was obviously and decidedly creditable to the country.

CHAPTER XXIV.

SOAP.

ITS COMMERCIAL IMPORTANCE—TEST OF CIVILIZATION—EARLY HISTORY OF—HOMERIC VIRGINS—PLINY, STRABO, GEBER—MODERN HISTORY OF—VARIETY OF SUBSTANCES EMPLOYED—DIFFERENT MODES OF MANUFACTURE—ITS PROPERTIES AND ACTION—NUMBER OF EXHIBITORS—EXTENSIVE USE IN GREAT BRITAIN—EXCISE DUTY.

The magnitude of the manufacture of soap, the importance of the trade, and the enormous capital embarked in it, as well as the wonderful relation which it bears with regard to the most important links in the chain of chemical industry, is not often sufficiently estimated. A distinguished chemist of the present day says:—"The quantity of soap consumed by a nation would be no inaccurate measure whereby to estimate its wealth and civilisation. Political economists, indeed, will not give it this rank; but, whether we regard it as joke or earnest, it is not the less true that, of two countries of an equal amount of population, we may declare with positive certainty, that the wealthiest and most highly civilised is that which consumes the greatest weight of soap. The consumption does not subserve sensual gratification, nor depend upon fashion, but upon the feeling of the beauty, comfort, and welfare attendant upon cleanliness; and a regard to this feeling is coincident with wealth and civilisation. The rich in the middle ages, who concealed a want of cleanliness in their clothes and persons under a profusion of costly scents and essences, were more luxurious than we are in eating and drinking, in apparel and horses; but how great is the difference between their days and our own, when a want of cleanliness is equivalent to insupportable misery and misfortune!" It is interesting to cast a glance upon the early history of this important branch of trade. No mention of soap is to be found in the works of authors prior to the Christian era. The term soap occurs repeatedly in the Old Testament, but the learned Beckmann has proved, in his *Treatise on Soap,* that the Hebrew word *borith,* which has been rendered soap, rather means alkali. One of the most ancient descriptions of bathing and washing is to be found in Homer's narrative of the preparations made by the mother of the lovely Nausicaæ, for the washing expedition to the river. Life-sustaining meats and refreshing wines, softening oil in golden vessels for anointing the skin, are carefully enumerated; but soap formed no part of the inventory. The Homeric virgins were ignorant of this invaluable oleo-alkaline compound. Pliny is the first writer who gives us an authentic account of soap. He states that it is made from tallow and ashes, the best materials being goats'-tallow and beech-ash. He was also acquainted with the hard and soft varieties of soap; he calls it a Gallic invention, but states that it was particularly well prepared in Germany, where the men were more in the habit of using it than the women. It served to colour the hair yellow. From the description of

Pliny, it is evident that he really means soap, although the purpose for which it was employed creates some difficulty; and it would appear that the soap of the ancients contained some colouring agent, and served chiefly as a hair-dye, and likewise as a remedial agent. It does not seem that it was used for the purposes for which it is now almost exclusively employed. Besides several kinds of fullers'-earth, and plants with saponaceous juices (*struthium*), the ancients availed themselves of solutions of soda and potash, which continue in use for washing in the present day. Strabo speaks of an alkaline water (soda) in Armenia, which was used by the scourers for washing clothes, and we find express mention of the employment of a lye made with the ashes of plants (potashes), in cleansing oil and wine jars, and the images of the gods in the temples. The method of strengthening the lye by means of quick-lime was known, undoubtedly, in the time of Paulus Ægineta. The agent most commonly used for washing garments, however, was putrid urine, which is still employed in the cloth districts for washing wool. The fullers were literally and metaphorically in bad odour, and were required to exercise their trade outside the town, or in unfrequented streets, but they were permitted to place tubs at the corners of the streets, for the convenience of passengers and their own profit. Regarding urine in the light of soap, the Emperor Vespasian may be said to have originated the soap duty, as this source of revenue was not lost sight of by him, though, as Beckmann remarks, it does not appear very clear how the tax was collected.

After Pliny, soap is mentioned by Geber, in the second century of the Christian era, and at a later period, frequently by the Arab writers: but although undoubtedly used for washing, it is spoken of chiefly as a remedial agent for external application. It would be a difficult matter to trace the onward progress of soap-making, step by step, but it is certain that the boiling of soap flourished in the seventeenth century, as we possess extensive directions of that date for its preparation. It is only in the most modern times, that the soap-manufacture has attained that extraordinary development which distinguishes this branch of trade; various circumstances have contributed to produce it. The valuable researches of Chevreul, although they explain the nature of saponification, have contributed less to the advance of the soap manufacture than to that of candle-making, hereafter to be described. On the other hand, the development of the manufacture of soda has proved a most powerful stimulus to that of soap, which, when freed from its dependence on the uncertain and limited supply of barilla and kelp, made such strides as could not have been anticipated. Mr. James Muspratt, who was the first in England to carry out successfully, and on a large scale, Leblanc's method of preparing soda from chloride of sodium (sea-salt), informs us that he was compelled to give away soda by tons to the soap-boilers, before he succeeded in convincing them of the extraordinary advantages to be derived from the adoption of this material. As soon, however, as he had effected this, and when the soap-boilers discovered how much time and money they saved by using artificial soda, orders came in so rapidly, that Mr. Muspratt, to satisfy the demand, had his soda discharged red-hot into iron carts, and thus conveyed to the soap-manufactories. From that period, a constant race was kept up between soap-making and the artificial production of soda; every improvement in Leblanc's process was followed by an extension of the soap-trade; and it is a curious fact, that the single seaport of Liverpool, exports annually more soap at present, than did all those of Great Britain, previous to the conversion of chloride of sodium into carbonate of soda. The manufacture of soap has, on the other hand, been a powerful stimulus to the preparation of soda and of the important secondary product, hypochlorite of lime (bleaching powder), which are so intimately allied with almost all branches of chemical trades. Thus soap occupies one of the most important pages in the history of applied chemistry. The increase in the consumption of this article has led, moreover, to the discovery of new

materials for its production. It has opened new channels to commerce, and thus it has become the means, as well as the mark of civilisation. Almost simultaneous with the employment of soda, the oils of the cocoa-nut and the palm have been introduced into the manufacture of soap. The statistics respecting the imports into the United Kingdom and France, demonstrate the increasing consumption of these oils. The development of the trade in palm oil has contributed largely to the abolition of the iniquitous slave-trade on the west coast of Africa, and in many parts of the coast, has entirely suspended it.

Before we proceed to the examination of the separate specimens of the soaps which were exhibited, a few words may be said respecting the materials employed in their manufacture. They are, on the one hand, alkalies, and on the other, fatty and resinous substances derived from the organism of animals and plants, especially tallow, lard, palm oil, cocoa-nut oil, olive oil, linseed oil, fish oil, and common resin. Although physically and chemically widely distinguished from one another, fats and oils present numerous analogies. Neither of these substances is a pure chemical compound; the majority are mixtures in varying proportions of different chemical bodies, which may be isolated by mechanical or chemical processes. When this separation has been effected, the isolated substances, which are the proximate principles of the fatty or oily bodies, though again differing much from one another, exhibit one common chemical character; when exposed to the influence of powerful decomposing agents, they are broken up in a similar manner, yielding on the one hand an acid, and on the other a neutral body. All fats may be resolved into two proximate fatty substances, one of which is fluid at the common temperature—it is termed olein; the other is solid, and is called stearin. The preponderance of one or the other of these proximate constituents determines the state of aggregation of the fat. The body usually designated stearine is generally a mixture of the stearin of the chemist and an analogous body, margarin; the two substances differing in their relative proportion according to the source from which the fat is obtained. Thus, the solid fat from sheep (tallow) contains chiefly stearin; that of the pig (lard) and of olive oil, chiefly margarin; the solid fat of palm oil is palmitin; that of cocoa-nut oil, cocin. Stearin, margarin, olein, palmitin, and cocin are all compounds of certain fatty acids, with oxide of glyceryl, and may be viewed as substances resembling neutral salts, or rather compound ethers. The changes which all these substances undergo, when submitted to the action of powerful bases, is well illustrated by the deportment of olein with oxide of lead (litharge). When boiled with this base, the olein is decomposed into oleic acid and oxide of glyceryl. The former combines with the base, forming an insoluble soap, called oleate of oxide of lead (diachylon plaster); and the oxide of glyceryl, separating in combination with water, forms glycerin (hydrated oxide of glyceryl), a substance having a certain analogy with the group of bodies termed alcohols. It remains dissolved in the water employed. If olein is boiled with a solution of potash or soda, oleates of potash or soda are obtained; but being soluble in water, they remain dissolved together with the glycerin.

The oleates of potash or soda, when separated from the water by processes immediately to be discussed, are what we call, in common life, soaps. Similar soaps are formed by the remainder of the fatty acids; for example, stearic and margaric acids. Palmitate of soda, obtained by boiling palm oil with soda, likewise forms a chief ingredient of many soaps. Potash and soda, as they occur in commerce, are combinations of the alkaline bases, thus denominated by the chemists, with carbonic acid, and though by long boiling they could decompose (saponify) fats, yet the operation is tedious, and the saponification generally incomplete. It is better to deprive the alkalies of their carbonic acid, which is done by mixing them with quicklime and water; the quick-lime combines with the carbonic acid, forming an insoluble carbonate of lime (chalk), and the water retains the potash or soda in solution, contaminated still with such impurities as the alkalies contained (sulphates

and chlorides, for example), and a minute quantity of caustic-lime. Common resin (colopony) is the residue of the distillation of natural turpentines, and consists principally of pinic acid, together with a litte sylvic and colophonic acids. When resin is boiled with alkalies, carbonated or not, a compound is readily obtained, but of course no glycerin. Thus, when it is boiled with soda, a pinate of soda is chiefly produced. This compound exists in considerable quantity in yellow soap, and gives to it its distinctive character. The character of soap is not only affected by the nature of the acids which it contains, but also by that of the alkali which has served for its preparation; the soaps containing potash are generally soft and pasty; those prepared with soda are hard and solid.

The compounds of stearic, margaric, oleic, palmitic, cocinic, pinic, and sylvic acids, with potash and soda, are all readily soluble in alcohol and hot water, but more so in the former, which, on evaporation, leaves the soap in a translucent state; hence its application in the preparation of "transparent soaps." Soaps, however, are insoluble in a solution of many neutral salts, particularly when concentrated; this property is of great use to the soap-boiler, who employs it for the separation of the soap from its solution in water, generally adding common salt to set the soap at liberty. As soaps are likewise insoluble in strong alkaline lyes, the same end is sometimes attained by boiling down the soap to a certain consistence, when it separates from the excess of lye. The soap made with cocoa-nut oil is, however, soluble in a very strong brine, and the same plan of separation does not succeed with it; but, as it is more generally employed together with other fats, this difficulty is then overcome. Its property of dissolving in salt water renders it peculiarly adapted to the formation of a marine soap. One remarkable property of cocoa-nut oil soap is, that of solidifying with a much larger quantity of water than most other soaps, thus giving a larger yield, but, of course, being of proportionally less value. This property is, however, unfortunately, often turned to profitable account by the soap-maker. As an instance, may be quoted an analysis of Dr. Ure, who found a London cocoa-nut oil soap to contain seventy-five per cent. of water, whereas twenty-five per cent. of water is a large quantity for any but potash soaps to contain, and these generally contain less than fifty per cent. The greater part of our knowledge concerning the chemical constitution of fats, and the changes which accompany their decomposition under the influence of alkalies, is due to the masterly researches of Chevreul, prosecuted with wonderful acuteness and perseverance, from 1813 to 1823, when they were published in Paris in a collected form, under the title of *Recherches Chimiques sur les Corps Gras d'Origine Animale*, a work which will ever remain a model of philosophical inquiry.

There are two processes chiefly employed in the preparation of soaps, the most simple of which is that called the *cold process*, or the *small-boiler process*. For the purpose of making soap in this manner, the alkaline lye is prepared from the purest commercial soda, and concentrated by evaporation. As the chloride of sodium and sulphate of soda, which commercial soda contains, are nearly insoluble in a strong alkaline solution, they crystallize out, especially on allowing the lye to stand for some days, thus leaving it much purer. A weighed quantity of fat is melted, and the strength of the lye having been previously ascertained by taking its specific gravity, a certain portion is weighed or measured, and separately heated, and then stirred with the melted fat. Saponification soon occurs, and on cooling, the soap solidifies. It is very evident that soap made in this manner must contain the glycerin; moreover, as it is very difficult to obtain an exact neutralization of the fat or alkali, one or the other is often in excess, generally the fat; this prevents such soap from giving so good a lather as those prepared by the more usual method.

The ordinary method is called the *large-boiler process*, and it is usually conducted on a very large scale, in boilers capable of holding many tons. A quantity of weak soda-lye is put into the iron or copper boiler, and raised to the boiling point; and

the whole of the fat is generally added at one time. The ebullition is then carried on for some time, and when the lye has become exhausted of its alkali, it is pumped away, and a fresh portion of lye is added. After repeated boilings and pumpings, the saponification is completed, and the soap is brought to strength by boiling down.

Now the soap-boiler may wish to prepare either white or mottled soap. If a white or curd soap is required, the soap is "fitted," that is, boiled with a certain quantity of water or weak lye, and allowed to settle, when the black impurities ("nigre") fall to the bottom, and the soap is then removed to the frames, and allowed to cool. These frames are composed of a number of separate planks, to facilitate the removal of the soap. The mottled soap is prepared in a similar manner, except that the operation of fitting is dispensed with, the "nigre" is left in the soap. This "nigre" consists chiefly of sulphide of iron, produced by the action of the lye, which always contains a minute quantity of sulphate of sodium, on the vessel. In Marseilles and other countries where olive-oil-soap is made, a quantity of sulphate of iron (green copperas) is added; and in this case the mottling is produced jointly by the sulphide of iron (the black portion) and a true iron soap (the red portion). In order that the metallic compound may not fall to the bottom (as in *fitting*), the soap has to be much more concentrated; when removed from the boiler it is of one uniform slate tint, but as it cools, the metallic compounds separate into nodules, and by trickling off the excess of lye through the mass, they take up certain forms, which produce the appearance called mottling. Hence mottled soap is of more value, from its containing a less proportion of water. It is evident, in comparing this with the cold process, that it is much more scientific; as an excess of alkali may be employed to ensure complete saponification, with the perfect certainty that it can be got rid of in the lyes: the glycerin is also removed, with the impurities contained in the fat, at each pumping; and a very pure chemical compound is obtained, notwithstanding the employment of comparatively impure materials. If the soda-ash employed does not contain sufficient saline impurities to throw up the soap, it is necessary to add a solution of common salt to effect this object each time the exhausted lye is pumped off.

The detergent property of soap is usually considered to be dependent entirely on the quantity of alkali which it contains, and hence the question arises, why pure alkali should not be employed in preference. An objection to this is the caustic character of the alkali, which is injurious, not only to the hands of the person using it, but also destructive of the articles washed, and especially of some colours of dyed goods. By combining with fatty acids, the alkalies are rendered essentially milder in their action, without being deprived of their capability of entering into combination with various impurities, and more particularly with certain fatty bodies. The most common explanation of the washing power of soap is founded upon Chevreul's observation, that soaps are decomposed by large quantities of water, giving rise on the one hand to acid soaps, and, on the other, liberating a quantity of free alkali which remains in solution. According to this view, soap is a sort of magazine of alkali, which it gives up in the exact quantity required at any moment when it is rubbed with water. The combination of the alkali with some part of the dirt cannot be denied. Several constituents of this very indefinite admixture of many substances are of an essentially acid character, especially those derived from perspiration: others become acid when exposed on a large surface to the action of the air, in consequence of a sort of spontaneous saponification. This action cannot, however, be the sole *modus operandi* of soap, the valuable properties of which, without doubt, arise, in a great measure, from its power of dissolving substances which are insoluble in water. We know that certain mineral salts exert a solvent power upon substances which are entirely insoluble in water: thus it is well known that borax causes shell-lac to dissolve with great facility, and the chemist will at once call to mind the remarkable solvent pro-

perty possessed by a soapy compound ready formed in the animal organism—bile is essentially a combination of an alkali with fatty acids (glycocholic and taurocholic), and it dissolves with great facility the neutral body, cholesterin, which, like fats, is soluble in water. In addition to these two modes of operation, soap doubtless also produces a mechanical effect. The property which it has of increasing the cohesion of water, so as to enable it to form a lather or froth, is most valuable in the removal of solid insoluble particles of dirt, which are carried away by the frictional action of the suds when forced into and out of the minute interstices of the substances subjected to the operation of washing, and are kept suspended by the froth, and thus prevented from again soiling them.

There were in the great Exhibition sixty-two exhibitors of soap. Many of these received prize medals, and not a few obtained honourable mention. In no country in the world is the manufacture of soap carried on to so large an extent as in the United Kingdom, in which there are 329 makers. Ireland not being subject to a duty on soap, there are no ready means of ascertaining the quantity which is there manufactured; but in Great Britain alone the production amounted, in the year 1850, to 204,410,826 lbs., and yielded an excise duty of £1,299,232 10*s.* 2*d.* Of this quantity 12,555,493 lbs. were exported to foreign parts, the drawback on it being £82,308 18*s.* 9*d.* The total quantity consumed in Great Britain, therefore, amounted to 191,855,333 lbs. Of this quantity 22,858,382 lbs. were used by manufacturers, on which the duty, amounting to £97,342 0*s.* 11*d.* was remitted. This leaves the net revenue derived from the soap-duty at £1,119,581 10*s.* 6*d.*, after deducting the drawback and the remission to manufacturers. Deducting the quantity exported, and that used by manufacturers, it appears that 168,996,951 lbs., or, in round numbers, 75,445 tons, were consumed in 1850 for domestic use in Great Britain (making 8 lbs. 1 oz. each person); besides that manufactured in Ireland, of which there are no returns. Of the different varieties of toilet and scented soaps, and of their general claims to prize medals and honourable mention, we have already spoken in a former chapter, when treating on the subject of "perfumery."

CHAPTER XXV.

WORKING MEN.

JAMES WATT—HIS EARLY LIFE—VARIOUS CLAIMS TO THE DISCOVERY OF THE POWER OF STEAM—FIRST REAL STEAM-ENGINE INVENTED BY WATT—ITS GREAT SUPERIORITY OVER FORMER INVENTIONS—VERSATILITY OF HIS GENIUS—HIS NUMEROUS IMPORTANT DISCOVERIES—STATUE IN WESTMINSTER ABBEY—JACOB PERKINS—HIS WONDERFUL INGENUITY—STEREOTYPE CHECK-PLATE—THE PERPETUAL MOTION—BATHOMETER—STEAM-GUN—JOSIAH WEDGWOOD—ELEGANT POTTERY—BARBERINI VASE, ETC., ETC.

As our object in describing the contents of the vast Emporium of Industry and Art, which forms the subject of our lucubrations, has, from the outset, been to give our readers as much variety as possible, we will now pause awhile in our dissertation on things produced, and indulge in a brief consideration of the original producers—those master minds which from time to time have appeared among us, and have diffused far and wide their light and their intelligence to the improvement of science and the benefit of mankind. We shall, therefore, in our present chapter, give a few brief sketches of the

lives of "working men," who, by their well-directed industry and ingenuity, have distinguished themselves above their fellows, and contributed new or improved principles of importance to the manufacturing resources of the world. We trust these notices will be interesting, as illustrative of the progress of art culture, and will also serve as an encouraging excitement to thousands of "working-men" of our own day, any one of whom may possibly have it in his power to add his mite to the general store of valuable experiences, and to receive his reward in fame and fortune for himself and his descendants.

James Watt.—The celebrity of some men may be compared to a meteor which appears for a short time and then vanishes away; their memory is only found in their marble monuments. Others, again, like planets, have succeeded in attaining a more permanent distinction; they have conferred benefits upon their fellow men which remain after them; they require no busts—no empty gorgeous structures to tell that they have lived; their memory is in their works. Of the latter class was James Watt, the immortal discoverer of the steam-engine. He was born in 1736, at Greenock, in Scotland, where his father was a merchant and magistrate. His grandfather and uncle both distinguished themselves as mathematicians and engineers. The subject of our memoir was educated in his native town, which has long been distinguished as a port of extensive commercial relations and for the elegance and substantiality of the works of its mechanics, especially in reference to navigation. Till the age of sixteen he continued at the grammar-school. At the age of eighteen he was sent to London, being bound to a distinguished mathematical instrument maker. Here, however, the delicacy of his health, from an attack of rheumatism, occasioned by working one winter's day in the open air, prevented him from deriving any advantage from his situation, and he was soon obliged to return to his native country. In 1757 he went to reside in the University of Glasgow, being appointed philosophical instrument maker to that seminary, with apartments in the building. In this situation he remained till 1764, when he married his cousin, Miss Miller. He then established himself in the town as an engineer. While in this capacity, he was consulted with regard to the great canal which traverses Scotland from east to west, termed the Caledonian Canal; and he is said to have projected the canal which unites the Clyde and the Forth. An accidental circumstance, however, had given a different bent to his pursuits. One of Newcomen's steam-engines had been sent to him from the Natural Philosophy class for the purpose of being repaired, and this turned his attention to the power of steam, of which he was destined to make such splendid applications.

It has been usually admitted that the first individual who ascertained the fact that steam was capable of raising weights or water, was the marquis of Worcester. M. Arago, however, in the *Annuaire* for 1837, denies the accuracy of this conclusion, and claims the discovery for Salomon de Caus, a countryman of his own. A few extracts in the words of the respective authors will enable the reader to draw his own inferences. Hiero, of Alexandria, 120 years before the Christian era, was acquainted with the fact that steam, under certain circumstances, could give rise to motion. In 1543, Blasco de Garay, a sea captain, proposed to the emperor Charles V., to make embarkations even when there was a perfect calm, and without sails and oars. In June of the same year he is said to have made an experiment with a vessel of 200 tons, which he carried into Barcelona, according to some at the rate of a league per hour; according to others at the rate of two leagues in three hours. The apparatus which he employed was a large cauldron of water attached to wheels connected with the sides of the vessel. This account is given by M. Gonzalez, in Zach's astronomical correspondence for 1826. It is altogether, however, so improbable that little importance can be attached to it; such is the Spanish claim to the discovery of the force of vapour. In 1615, Salomon de Caus wrote a work entitled *Les Raisons des Forces Mouvantes, &c.* In this he states that if water be introduced into a copper globe,

with a tube passing vertically through the upper part of the globe, and dipping under the surface of the water, on the application of heat to the globe the water will be driven up the tube; he observes—"the force of the vapour (produced by the action of fire) which causes the water to rise is produced from the said water, which vapour will depart after the water shall have passed out with great force." This is the French claim to the invention of the steam-engine. In 1629, Branca, of Rome, described the eolipyle, or vapour blow-pipe. This, however, has little connection with the subject. In 1663, the marquis of Worcester published his *Century of Inventions*. In his sixty-eighth invention, he states that he has discovered an admirable and very powerful method of raising water by the assistance of fire, not by aspiration, for as the philosophers say, *intra sphœrum activitatis*, the aspiration acting only at certain distances; "but my method has no limits if the vessel possesses sufficient strength." He took a cannon, filled it to three-fourths with water, and shut up the open end; he then kept up a constant fire around it, and in the course of twenty-four hours the cannon burst with a great noise. "Having a way to make my vessels so that they are strengthened by the force within them, and that they are filled in succession, I have seen water run in a continuous manner, as from a fountain, to the height of forty feet. A vessel full of water rarefied by the action of fire, raised forty vessels of cold water. The person who superintends this experiment has only two stop-cocks to open, so that at the instant when one of the two vessels is emptied, it is filled with cold water during the time that the other begins to act, and this in succession. The fire is kept in a constant degree of activity by the same person, he has sufficient time for this during the intervals which remain after turning the stop-cocks." Such is the English claim to the discovery of the steam-engine. Whatever opinion may be arrived at, one thing is certain, that if his predecessors were ignorant of the force of vapour and its moving power, the marquis of Worcester was quite familiar with them. In 1683, sir Samuel Moreland wrote his *Elevations of Water by all kinds of Machines, &c.*, a manuscript preserved in the British Museum. He observes, that "water being evaporated by the force of fire, its vapours require a much greater space (about 2,000 times) than the water previously occupied, and rather than be confined will burst a piece of cannon. But being well regulated according to the rules of statics, and by science reduced to measure, to weight, and to balance, then they will carry their burdens peaceably (like good horses); and thus they will be of great use to the human race, particularly for raising water." In 1690, Denis Papin, a native of Blois, in France, first thought of placing a piston in a cylinder, and acting upon it by the force of steam. It is unnecessary to enter into the question of the priority of the discovery of the steam-engine from the preceding details, because they appear merely to demonstrate the force of steam, or its moving power—the alphabet of the steam-engine.

In 1698, captain Savery obtained a patent for an instrument in which the power of steam was applied to practical purposes. The water was placed in a boiler, the steam escaped by a tube at the upper part of the boiler into a large spherical vessel, where, upon being condensed, a vacuum was formed, which enabled the atmosphere to act. It was, therefore, the atmosphere, and not the steam which was the moving power. In 1705, a patent was taken out for an improved engine on the same principle, in the names of Newcomen, Crawley, and Savery. It was in 1764, that James Watt was employed to repair a model of one of these engines belonging to the Natural Philosophy class in Glasgow college. He was struck with the defects of the machine, and set about improving it. In 1768, he completed his first engine, which, as with those now in use, differed from that of Newcomen by the condensation of the steam taking place in a second vessel, so that the descent of the piston was produced by the force of the steam, and not by atmospheric pressure; the ascent of the piston was also produced by the power of the steam. The engine of Watt was therefore a true steam-engine; those which preceded it can only be considered as

machines which produced certain effects by the atmosphere acting on a vacuum produced by the condensation of steam.

Dr. Roebuck supplied Watt with the means of accomplishing this great work, and in 1769 he obtained his first patent. Watt had remarked that two-thirds of the steam were condensed by the contact with cold water; hence there was a loss of two-thirds of the fuel. He first attempted to substitute a wooden pipe for a tube of iron, considering that the wood is a worse conductor of heat; but he found that the wood had less resistance to the sudden alternations of temperature. He then thought of passing the steam into an iron tube without cooling the walls of the tube; this constituted the invention of the condenser. This vessel, free from air, and communicating with the water, being opened at the moment when the tube is filled with steam, draws the latter towards it, and when the vessel receives at the same time a jet of cold water, the steam which is passing to fill it is condensed; the remaining part of the steam in the pipe is removed into the vacuum caused by condensation, and thus the piston is allowed free play. To get rid of the water in the condenser, a small air-pump was applied, which was worked by the piston. The invention of the condenser was then Watt's first great improvement. The second was the admission of steam above and below the piston according as it was to be depressed or raised. He surrounded the metal tubes with wood in order to keep in the heat. He calculated with precision the quantity of fuel necessary for producing a certain portion of steam and the volume of cold water required to condense it. Such were the inventions for which the new patent was obtained, but funds were wanted to extend the utility of the discovery. Fortunately, in 1776, Dr. Roebuck, who had exhausted his means, met with a purchaser of his interests in the patent in the person of Matthew Bolton, of Birmingham. To him, therefore, it may with justice be said that the country owes the present diffusion and importance of the steam-engine. The firm of Watt and Bolton commenced their manufactory at Birmingham by constructing a steam-engine, which all those interested in mining were requested to inspect. The invention began gradually to be appreciated, especially in Cornwall, and Watt's engine very soon replaced that of Newcomen. One great encouragement to adopt the new engine was the terms upon which it was supplied. The agreement was, that one-third of the saving of fuel over the old engine should be the price of the new engine. The saving was carefully ascertained in this way: the quantity of fuel necessary for producing a certain number of strokes of the piston was ascertained by Newcomen's engine and by a new one of the same dimensions. The number of strokes were determined by means of a piece of clock-work, termed the *counter*, attached to the engine, and so arranged that every stroke advanced the hand one division. The instrument was placed in a box supplied with two keys, and was opened at the time for settling accounts in presence of the agent of Watt and Bolton, and of the director of the mine. To show the amount of saving it is only necessary to state that the sum which the firm derived from three engines in one year at the Chace-water mine, in Cornwall, amounted to £2,382, proving that the saving of fuel by the new plan was equal to upwards of £7,000 per annum, being equivalent to £2,382 per annum on each engine.

The manufactory of Soho speedily extended its limits, and what was once a sterile hill soon became a populous and fertile hamlet. The firm obtained an extension of their patent to 1800. To this period the engine had only been employed to raise water; but, in 1800, Watt began to think of applying it to mills. This, he conceived, might be effected on the principle of the spinning-wheel, where the impulse which turns it one-half, completes the revolution. While engaged with his models, he learned that a manufacturer of Birmingham, named Richards, had constructed what he was in search of. He procured a plan of it, and found that it was precisely his own; he ascertained that his own plan had been sold by one of his faithless workmen to Richards, who had procured

a patent. It was too late to claim the invention, and he therefore sought for a new plan. He accordingly invented what is termed the sun and planet motion.

The intelligent and aspiring mind of Watt, however, was not content with directing its attention to one subject alone. He invented, in 1779, a copying-press, consisting of two cylinders, between which a sheet of moistened paper was passed and applied over a printed sheet; this contrivance was very successful. In March, 1787, he introduced into Great Britain the method of bleaching cotton by means of chlorine, which had been discovered in France by Berthollet.

This claim was at one time disputed in favour of Professor Copland, of Aberdeen; but it was quickly set at rest on the side of Mr. Watt. In 1800 he retired from the firm with a handsome fortune, and was succeeded by his son, who continued along with the son of Mr. Bolton to carry on the manufactory. During his residence in Glasgow his first wife died. At Birmingham he married the daughter of Mr. Macgregor, a manufacturer in Scotland; with whom, in the heart of his family, he happily spent the evening of his days. He was elected a fellow of the Royal Societies of London and Edinburgh, and the Institute of Paris, in 1808, made him one of their eight foreign associates. In 1817 he visited Scotland for the last time. In the course of two years afterwards his health broke down, and he died on the 25th of August, 1819, aged eighty-four years, beloved and respected by all. Mr. Watt was one of the most extraordinary men of any age. He was not only a mechanic, he was an accomplished scholar, and yet in a great measure self-taught. He was familiar with the modern languages, and had an excellent acquaintance with chemistry, physics, antiquities, architecture, and music; in short, he was generally well-informed. Possessing all these requisites, and a splendid benefactor of his country, it is remarkable that government never conferred any honour upon him. Immersed in expensive wars, which deluged foreign lands with the blood of our fellow-creatures, and impoverished our own people, it sought only to bestow rewards on those who were foremost in the fight. It was perhaps well; the days of these men are past, but those of Watt will endure for ever. The visitor to the ancient relics of Westminster Abbey may have noticed many a gorgeous monument in memory of individuals who have left no record behind them, save these heartless stones, or a notice, perhaps, in the history of battles of their having assisted in the premature death of some friend of freedom, or unfortunate foe; he looks long in vain for the monuments of those who have succeeded in advancing the powers of the mind, and at last espies an obscure tablet which tells that only a mere spot can be spared for the truly mighty dead. The memory of Watt was left to be established in peaceful times, when a philosopher, the hero of intellect, is valued above a hundred warriors, the heroes of the passions; for Watt assisted in superseding the barbarism of war. A handsome statue of Watt was erected, in 1824, at Birmingham. Glasgow has a similar tribute to his memory, and Westminster Abbey can now boast of having deposited within its walls a marble statue of one who has conferred greater benefits on his country and on the world than perhaps any individual commemorated by its monuments.

Our next "worthy" we select from our transatlantic brethren. Jacob Perkins was descended from one of the oldest families of that ancient portion of the state of Massachusetts, the county of Essex—a region of stubborn soil, but rich in its production of *men*. Matthew Perkins, his father, was a native of Ipswich, and his ancestor was one of the first settlers of that town. Matthew Perkins removed to Newburyport in early life, and here Jacob Perkins was born, July 9th, 1766. He received such education as the common schools of that day furnished, and nothing more. What they were in 1770 may be guessed. At the age of twelve he was put apprentice to a goldsmith of Newburyport, of the name of Davis. His master died three years afterwards; and Perkins, at

fifteen, was left with the management of the business. This was the age of gold beads, which our grandmothers still hold in fond remembrance—and who wonders? The young goldsmith gained great reputation for the skill and honesty with which he transformed the old Portuguese *joes*, then in circulation, into those showy ornaments for the female bosom. Shoe-buckles were another article in great vogue; and Perkins, whose inventive powers had begun to expand during his apprenticeship, turned his attention to the manufacturing of them. He discovered a new method of plating, by which he could undersell the imported buckles. This was a profitable branch of business, till the revolutions of fashion drove shoe-buckles out of the market. Nothing could be done with strings, and Perkins put his head-work upon other matters. Machinery of all sorts was then in a very rude state, and a clever artizan was scarcely to be found. It was regarded as a great achievement to effect a rude copy of some imported machine. Under the old confederation, the state of Massachusetts established a mint for striking copper coin; but it was not so easy to find a mechanic equal to the task of making a dye. Perkins was but twenty-one years of age when he was employed by the government for this purpose; and the old Massachusetts cents, stamped with the Indian and the Eagle, now to be seen only in collections of curiosities, are the work of his skill. He next displayed his ingenuity in nail machinery, and at the age of twenty-four, invented a machine which cut and headed nails at one operation. This was first put in operation at Newburyport, and afterwards at Amesbury, on the Merrimac, where the manufacture of nails has been carried on for more than half a century. Perkins would have realised a great fortune from this invention, had his knowledge of the world and the tricks of trade been in any way equal to his mechanical skill. Others, however, made a great gain from his loss; and he turned his attention to various other branches of mechanical arts, in several of which he made essential improvements, as fire-engines, hydraulic machines, &c. One of the most important of his inventions was in the engraving of bank bills. Forty years ago, counterfeiting was carried on with an audacity and a success which would seem incredible at the present time. The ease with which the clumsy engravings of the bank bills of the day were imitated, was a temptation to every knave who could scratch copper; and counterfeits flooded the country, to the serious detriment of trade. Perkins invented the stereotype check-plate, which no art of counterfeiting could match; and a security was thus given to bank paper which it had never before known. There was hardly any mechanical science in which Perkins did not exercise his inquiring and inventive spirit. The town of Newburyport enjoyed the benefit of his skill in every way in which he could contribute to the public welfare or amusement. During the war of 1812, his ingenuity was employed in constructing machinery for boring out old honeycombed cannon, and in perfecting the science of gunnery. He was a skilful pyrotechnist, and the Newburyport fireworks of that day were thought to be unrivalled in the United States. The boys, we remember, looked up to him as a second Faust or Cornelius Agrippa; and the writer of this article has not forgotten the delight and amazement with which he learned from Jacob Perkins the mystery of compounding serpents and rockets. About this time, a person named Redheffer, made pretensions to a discovery of the perpetual motion. He was traversing the United States with a machine exhibiting his discovery. Certain weights moved the wheels, and when they had run down, certain other weights restored the first. The experiment seemed perfect, for the machine continued to move without cessation; and Redheffer was trumpeted to the world as the man who had solved the great problem. Perkins gave the machine an examination, and his knowledge of the powers of mechanism enabled him to perceive at once that the visible appliances were inadequate to the results. He saw that a hidden power existed somewhere, and his skilful calculations detected the corner of the machine from which it proceeded. "Pass a saw through that post," said he, and your perpetual

motion will stop." The impostor refused to put his machine to such a test; and for a sufficient reason. It was afterwards discovered that a cord passed through this post into the cellar, where an individual was stationed to restore the weights at every revolution. The studies, labours, and ingenuity of Perkins were employed on so great a variety of subjects, that the task of specifying and describing them must be left to one more fully acquainted with the history of the mechanical arts in the United States. He discovered a method of softening and hardening steel at pleasure, by which the process of engraving on that metal was facilitated in a most essential degree. He instituted a series of experiments, by which he demonstrated the compressibility of water, a problem which for centuries had baffled the ingenuity of natural philosophers. In connexion with this discovery, Perkins also invented the bathometer, an instrument for measuring the depth of the sea by the pressure of the water; and the pleometer, to measure a ship's rate of sailing. Perkins continued to reside in his birth-place till 1816, when he removed from Newburyport to Boston, and subsequently to Philadelphia. His attention was occupied by steam machinery, which was beginning to acquire importance in the United States. His researches led to the invention of a new method of generating steam, by suddenly letting a small quantity of water into a heated vessel. After a short residence in Philadelphia, he removed to London, where his experiments with high-pressure steam and other exhibitions which he gave of his inventive powers, at once brought him into general notice. His uncommon mechanical genius was highly appreciated; and his steam-gun was for some time the wonder of the British metropolis. This gun he invented in the United States, and took out a patent for it in 1810. It attracted the notice of the British government in 1823, and Perkins made experiments with it before the Duke of Wellington and a numerous party of officers. At a distance of thirty-five yards he shattered iron targets to pieces, and sent his balls through eleven planks, one inch thick each, and placed an inch apart from one another. This gun was a very ingenious piece of workmanship, and could discharge about one thousand balls per minute. Perkins continued in London during the remainder of his life. He never became rich. He lacked one quality to secure success in the world—financial thrift. Everybody but himself profited by his inventions. He was, in fact, too much in love with the excitement of the chase, to look very strongly at the pecuniary value of the game.

We shall close our present chapter with a short notice of Josiah Wedgwood, whose name fully deserves to be recorded in the list of English worthies. To many artists this may be a name but little known; it therefore becomes the more necessary, in a work of this description, to state a few facts connected with the life of this extraordinary man. He was born on the 12th of July, 1730, at Burslem, in Staffordshire, where his father carried on business as a potter. The limited opportunities afforded him for acquiring education may be judged of by the statement of his biographer; that at eleven years of age he worked in his elder brother's pottery as a "thrower." This occupation he was compelled to relinquish in consequence of an incurable lameness in his right leg, caused by the small pox. After a time he entered into partnership with a person named Harrison, at Stoke; and during this period his talent for the production of ornamental pottery first displayed itself. A dissolution of partnership ensued, and, in connection with a person named Wheildon, he manufactured knife-handles in imitation of agate and tortoise-shell, also imitative leaves, and similar articles. Wedgwood returned to Burslem, and commenced the manufacture of a cream-coloured ware called "Queen's" ware. He was, by Queen Charlotte, appointed her potter. His business greatly improving, he, in conjunction with Mr. Bentley, a man of taste and scientific attainments, obtained the loan of specimens of sculpture, vases, cameos, intaglios, medallions, and seals, suitable for imitation by the processes Wedgwood had discovered. His ingenious workmen, trained in his

manufactory, produced the most accurate and beautiful copies of vases from Herculaneum, lent by Sir William Hamilton.

About this time, 1763, the celebrated Barberini vase (in the British Museum, sometime since broken by a lunatic, but now admirably restored), was offered for sale, and Wedgwood bid against the Duchess of Portland; but on her promising to lend it to him to copy, he withdrew from bidding, and the duchess became the purchaser, at the price of eighteen hundred guineas. Wedgwood sold fifty copies of it at fifty guineas each; but the cost of producing them exceeded the amount of the sum thus obtained. After numerous experiments upon various kinds of clay and colouring substances, he succeeded in producing the most delicate cameos, medallions, and miniature pieces of sculpture in a substance so hard as to resist all ordinary causes of destruction or injury. Another important discovery made by him was that of painting on vases and other similar articles, without the glossy appearance of ordinary painting on porcelain or earthenware—an art practised by the ancient Etruscans, but lost since the time of Pliny. Amongst other artists employed by Wedgwood was Flaxman, who assisted him in producing those beautiful sculpturesque ornaments which he was the first in modern times to execute in pottery. In 1771 he removed to a village which he erected near Newcastle-under-Lyne, and characteristically called Etruria. Here his works became a point of attraction to all civilised Europe. Not only did he encourage artists; but he created a great trade in pottery, and by his talent improved the national taste. Wedgwood's success led to the establishment of improved potteries in various parts of the continent of Europe, as well as in several places in Great Britain and Ireland. His exertions were not merely confined to his own manufactory, but were cheerfully given to the establishing of several useful measures. On the 17th of July, 1766, he cut the first clod for the formation of the Trent and Mersey Canal, which, by the skill of Brindley, completed a navigable communication between the potteries of Staffordshire and the shores of Devonshire, Dorsetshire, and Kent. Wedgwood was a Fellow of the Royal Society, and of the Society of Antiquaries, and had bestowed considerable attention on the science of the action of light, with a view to fixing the images produced by the camera; but neither he nor Sir Humphrey Davy, who also investigated the subject, were fortunate enough to discover any method of retaining these images—a wonderful step in chemistry applied to the arts, which was reserved for Niepce, nearly half a century later. After a successful and honourable career, by which Wedgwood amassed an ample fortune, he died, at the age of sixty-five, on the 3rd of January, 1795. A very fine portrait of this son of genius was painted by Sir Joshua Reynolds, which still exhibits all its original freshness and truth of colour. Indeed, it has been observed that Sir Joshua never tried any of his dangerous experiments in art, when he had a sitter whose fame he deemed worthy to descend to posterity; and such a compliment he deservedly paid to the subject of this memoir.

CHAPTER XXVI.

TAXIDERMY, AND ETHNOGRAPHICAL MODELS.

EGYPTIAN EMBALMERS—GREEKS AND ROMANS—THE CALEDONIAN BOAR—ANCIENT TEMPLES—ITALIAN MUSEUMS—ASHMOLEAN MUSEUM—BRITISH MUSEUM—ANCIENT AND MODERN TAXIDERMY COMPARED—ELK FROM TURIN—THE DODO—BARTLETT—HANCOCK—THE HOODED HAWK—THE COMBAT WITH THE QUARRY—THE TROPICAL GROUP—GORDON—LEADBEATER—WILLIAMS AND GARDINER—WURTEMBURG COLLECTION—HERMANN PLOUCQUET—REYNARD THE FOX—ETHNOGRAPHICAL MODELS—MEXICAN AND AMERICAN INDIANS—THE JAMMA BUNDI—MODELS OF KISHNAGHUR—HINDOOS—VARIOUS TRADES—THUGS—COURTS OF JUSTICE IN INDIA—SILK FACTORY, ETC.—MALTESE COSTUMES—SPANISH BULL FIGHTS, ETC.

The art of stuffing animals is generally supposed to be an invention of modern date, and to have originated about the period when the various museums of natural history were founded in Europe. But traces of the art are to be discovered in the earliest records of antiquity, although the methods then employed differ much from those now practised. The procedure of the ancient Egyptians in embalming human remains and dead animals, in some measure resembles the manipulations of the taxidermist; inasmuch as in both, the parts peculiarly subject to decomposition are removed and replaced by more durable materials. But whilst the Egyptian embalmer desired rather to preserve the substance of the body than its form, the taxidermist sacrifices all, except the skin, to the obtaining of a natural representation of the aspect of the living animal. The ancient Greeks and Romans, however, endeavoured to preserve the form, as well as the substance, of the body; but their methods fulfilled the object very imperfectly. The ordinary proceeding consisted in immersion in melted wax or in honey; this necessarily disguised the shape, even though it remained unimpaired. Perhaps the best of the ancient methods for the preservation of animal substances consisted in placing them in a solution of common salt; which is still done, though for very different purposes. In this manner the sow, which, by bringing forth a litter of thirty pigs, afforded a happy omen to Æneas, was preserved by the priests; and it remained in such excellent preservation, that it was said to have been in existence at Lavinium in the time of Varro. In the same way were preserved two hippocentaurs (probably monstrous births), and also an ape, which, having been sent by the Indians to the Emperor Constantius, happened to die on the road.

It appears to have been the business of the priests to preserve rare animals, or rare natural specimens generally; and this was so prevalent, that we are almost tempted to refer the origin of museums of natural history to the temples of antiquity. Indeed Beckmann, in his *History of Inventions*, quotes a number of instances which support this view. And although it cannot be positively* asserted, from the notices in the Greek and Latin authors, on the subject under review, that methods resembling those used by the animal-stuffer were employed by the ancients; still the circumstance that animals were frequently suspended in the temples, shows that they were not invariably preserved

* In one of the epistles of Horace (Epist. lib. i., Epist. 2, i., 65) addressed to Lollius, a passage is met with, which has been generally construed into a knowledge of taxidermy among the ancients. The words are—

"Venaticus, ex quo
Tempore cervinam pellem latravit in aula
Militat in silvis catulus."

Many interpret *pellis cervina* as a stuffed stag, placed in the hall, and barked at by the dog. This explanation assumes that the ancients decorated their halls in such manner; like a modern hunting-box. The passage is however, intelligible if we translate *pellis cervina* as the mere skin of the stag.

in salt or honey. The ancients must consequently have possessed methods of preserving animal substances in the dry state; but they appear to have been ill-adapted to the purpose, for the head of the celebrated Caledonian boar, which Pausanius saw in one of the temples of Greece, had evidently suffered by time or the ravages of insects, and had lost the greater part of its bristles.

The art of preserving animals appears to have been but little, if at all, practised during the middle ages; for we rarely meet with a notice of natural objects being kept as curiosities in the treasuries of emperors, kings, and princes. It is only in the records of the period when the study of natural science was resuscitated, that passages are to be met with indicative of a knowledge of taxidermy, though sportsmen had undoubtedly practised it much earlier, in a rough manner,* for the purpose of making effigies of callbirds, in the absence of the living bird, while they imitated the note of the bird with their own voice, or some artificial contrivance.

The first records of collections of objects of natural history relate to the second half of the sixteenth century; and it appears from them that such museums existed chiefly in Italy, in relation to which the name of Francesco Calceolari deserves especial mention (Verona, 1584). These collections, which were commenced by private individuals, from purely scientific motives, increased in number and importance in the seventeenth century. This period gave birth to the collection of the Tradescants (father and son), which was purchased in 1659, by Elias Ashmole, who presented it, in 1683, to the university of Oxford, and thus founded the Ashmolean museum; and also to the collection of James Petiver, which was much enriched by Sir Hans Sloane, and, on the death of this distinguished naturalist, became the nucleus of the British Museum. It is from this epoch, in which the majority of continental collections took their origin, that the art of preserving skins must be dated; and, from the moment it became subservient to science, it kept pace with the growth and requirements of these institutions.

It was a point of extreme interest, to compare the admirable productions in taxidermy contributed to the Great Exhibition with the old specimens of the art of animal stuffing to be met with here and there in the museums of natural history. Nothing more dissimilar can be imagined; for while the successful productions of modern times present nature to our eyes, and show that the artist has closely studied her hidden secrets, the animals of the old stuffers resemble anything but that which they are intended to represent. It would appear that the study of nature was not deemed to be essential, and that imagination took its place and was allowed great latitude in the putting up of the stuffed effigies; so much so, that the living prototype would have recoiled in horror from the contemplation of its defunct representative. The older taxidermists had evidently to direct their entire attention to overcoming the difficulties presented by the material, the preservation of which was the main point. At first they contented themselves with removing the intestines and the brain, especially in birds; they then attempted to prevent the putrefaction of the remaining parts, by exposing the bodies to a gradually increasing temperature, for the purpose of expelling all the water. But, however carefully the drying was attended to, it is evident that these productions were of

* Although the foregoing sketch suffices to show that the art of taxidermy can only have been very gradually developed, still it will not be inappropriate to introduce in this place the often-told, but improbable, anecdote of a rich gentleman of London, named Lever, who is said to have possessed a valuable collection of living birds. These all died in one night, owing to the stove used in the aviary having cracked, and the vapours suffocating them. The intensity of Mr. Lever's grief at the loss of his favourites, induced him to make an effort at preserving their dead bodies, and he is said to have succeeded in this by the aid of a physician, who invented animal stuffing for the occasion. These birds are reported to have given rise to the Leverian Museum, specimens from which may yet be met with in the British Museum.

an ephemeral character, as they afforded a tempting prey to many descriptions of insects. An improvement was next effected by removing the large fleshy muscles, the entire skeleton still remaining. At present, the skin alone is preserved; all parts that rapidly undergo putrefaction being carefully removed. By this means, and by the aid of modern chemistry, which has yielded a series of useful preparations to the taxidermist, the putrefaction of the stuffed animals is prevented. The operator is consequently enabled to direct his attention to other points of great importance; and, from the moment of being freed from anxiety respecting the preservation of his subject, he strives to perfect his mode of representing nature, and thus completely alters the range of his art. The skin of the animal has now become, in the hands of the taxidermist, a crude material, to be endowed with form and life-like attributes, as the marble under the chisel and mallet of the sculptor; and unless, like him, he prepares his mind by anatomical studies, and a close observation of nature, he will surely fail to realize a satisfactory production. The works of art—for, to many of the specimens the term might be well applied—exhibited in this department, proved that animal stuffing had been cultivated with unequivocal success.

Among the many interesting specimens of stuffed animals which we noticed in the Great Exhibition, one of the most remarkable was an elk, from the zoological museum at Turin. It exhibited to perfection the art of representing the living animal, not only in its general form and character, but marking also the fine and delicate undulations of the flesh and muscles, and all the anatomical details which are externally traceable. The difficulty of effecting this is so great that in general it is scarcely attempted; but in the present instance the artist was completely successful. The process adopted by Sig. Comba, the exhibitor of this specimen, was that of modelling the animal in clay, and from that model forming a mould; which mould enabled him to construct a figure of a material resembling papier-maché, retaining all the fidelity of the original model; upon this figure the skin is stretched. The number of British exhibitors was thirteen, among whom the following deserved especial notice. A. D. Bartlett exhibited an ingenious example of the art in the constructed figure of the Dodo—a bird which was once a native of Mauritius, and found there in considerable numbers at the beginning of the last century; but which now, as far as is known, is entirely extinct. The drawings of Savery, preserved in the Belvedere at Vienna, and in the Royal Gallery at Berlin, and some remains of a skeleton, formerly in the collection, already alluded to, of Elias Ashmole, consisting now but of the head and one foot, are the data from which the figure has been compiled. The process is of course very different from that of preserving a real animal, the skeleton and skin of which are entire; an artificial body has to be constructed, and then covered, feather by feather, with such plumage as is most in accordance with our knowledge of the bird. This was very skilfully executed; and the result, by the testimony of Mr. Strickland, and of Mr. Gray of the British Museum, "represented with great accuracy the form, dimensions, and colour of the Dodo, as far as these characteristics can be ascertained from the evidences which exist, whilst it reflected great credit on Mr. Bartlett's skill, and his practical acquaintance with the structure of birds."

There were other specimens exhibited by Mr. Bartlett, which were perhaps more attractive, inasmuch as they represented nature with a fidelity of which all could judge. The pair of Impeyan Pheasants, entitled "Courtship," and the sleeping Ourang-outan, "Repose," were especially deserving of notice. The fleshy parts of the latter were very skillfully treated; and the dried and shrivelled appearance which they so often assume was entirely avoided. J. A. Hancock, of Newcastle, exhibited, in the North Transept, some beautiful examples, not only of a faithful and spirited adherence to life and nature, but of a skilful and harmonious combination of forms and colours. The three illustrations

of hawking, and the scene in the tropics will go far towards raising the art of Taxidermy to a level with other arts, which have hitherto held higher pretensions. The first of the three objects, illustrating the ancient sport of falconry, was the Hooded Hawk, looking lean and hungry, with the strap attached to his leg, by which he is held on the falconer's fist. In the second group, the falcon has struck to the ground, and is in combat with the *Quarry*, a powerful heron, who is struggling in vain against the attacks of his enemy; whilst the eel, which, but for the interposition of the hawk, would have been soon devoured by the heron, is quietly making his escape. The third tableau exhibited the gorged falcon; what a contrast was here presented! the blood-thirsty enemy of the heron is scarcely to be recognised in the drowsy figure; standing on one foot, the other being drawn up under his breast, the eye half-closed, he is the very image of gluttony. The tropical group comprised cockatoos and parrots, disporting in a rich tropical vegetation, with brilliant butterflies and beetles, lizards, and other reptiles. The stolid, heavy, self-satisfied expression of the parrots was well brought out by comparison with the anxiety and trepidation of the Mate of the Dead Gull, in another group; or, with the restless gaze of the Lämmergeyer of the Alps. The contrast between life and death was also well kept up, by the display of a group of dead game, the ruffled state of the feathers being exceedingly truthful.

C. Gordon exhibited a representation of an owl "mobbed by small birds," in which the action of the owl and of his tormentors was given with great liveliness and fidelity. A dog, exhibited by Dr. Beevor of Newark, prepared much in the same way as the elk contributed from Sardinia, was deserving of favourable notice. J. Leadbeater exhibited an instructive and curious collection of Indian gallinaceous birds; and an extensive collection of humming-birds, comprising about 300 or 400 varieties, in the North Transept, which were most beautifully set up. A brilliant assemblage of richly-plumaged birds from various parts of the world was also exhibited by Messrs. T. Williams and Gardiner. They were, however, apparently of a class rather for the drawing-room than the cabinet of the naturalist. Those denizens of the air were chiefly selected which were most distinguished for the brilliant colouring of their plumage; and, so far as the careful preservation of it was concerned, they deserved commendation; but in respect to a delineation of the habits of the birds by appropriate scenery, they fell short of the excellencies attainable in this art. We have already in a former chapter briefly alluded to the collection of stuffed animals from Wurtemburg. As, however, the subject was so popular in the Great Exhibition, it will, perhaps, be not altogether unacceptable, at least to the more juvenile portion of our readers, if we again refer to the subject.

"We shall not ask Jean Jacques Rousseau
If birds confabulate or no;"

It is enough for us that from the days of wise Æsop to those of Fontenelle and Gay they have been supposed to do so; and the learned Dean of St. Patrick, in his immortal Gulliver, has sanctioned the same idea: we shall therefore without further preamble, encouraged by the sage remark of our friend Horatius Flaccus,—

"Dulce est desipere in loco,"

indulge, for a time, our more mirthful propensities in an investigation of the "Comicalities," if we may so term them, exhibited by the playful imagination of Hermann Ploucquet; who, besides an amusing display of numerous lively and spirited groups of birds, weasels, cats, hares, and other animals, in a variety of laughable situations, also illustrated, from the designs of Kaulbach, the story of "Reynard the Fox," a work which in Germany is as popular as our "Jack the Giant-killer." Carlyle says, "Among the people it was long a house-book, and universal best-companion; it has been lectured on

in universities, quoted in imperial council-halls; it lay on the toilets of princes, and was thumbed to pieces on the bench of the artizan." We shall proceed *seriatim* to describe the several points of action which our taxidermist laid before an admiring public.

In the opening scene we beheld the hero of the piece at home in his castle of Malepardus, reposing on a couch, and apparently ignorant of the heavy crimes that were brought against him at the royal court of the lion. One of these delinquencies was told in the next group, which represented the fox as a penitent hermit with his rosary, imposing upon a credulous cock, who, "with spectacles on nose," was perusing a forged document from the king of beasts, to the subsequent destruction of a part of his feathered brood. We read in our old English version of this tale how the fox was next summoned to the court of his royal master, and how Bruin, the bear, in an evil hour, undertook to bring the false knave into the hall of justice. Reynard, however, by an ingenious stratagem, defeats his enemy, and sends him back discomfited and sorely wounded. The wrath of the lion may be easily imagined at the insult offered to his messenger; taking wiser counsel, however, he despatches Sir Tibert, the cat, to bring the offender before his royal presence. The wily fox is, nevertheless, more than a match for his subtle betrayer, and, pretending to introduce the unwary grimalkin into the priest's barn on a mouse-catching party, decoys the poor cat into a trap; where, being mistaken for the fox, he is sorely beaten by the priest and his servants, and barely escapes with his life to tell his tale of grievance to the incensed king. A variety of similar attempts and similar failures to secure the culprit are next recorded in this amusing tale, until at length Reynard, bothered out of his life, resolves to go to court at once, which he accordingly does, and pretends he is acquainted with a hidden treasure, the possession of which he can secure to his majesty. Accordingly, in the next group we behold him dragging on Kyward, the hare, a reluctant witness to his statement. The king, blinded by his avarice, is easily imposed upon; he therefore pardons the fox, who, to get entirely out of the king's way, pretends that he has been excommunicated, and that it is necessary he should go on a pilgrimage to Rome. We accordingly next behold him on his way to the eternal city with staff and beads, devoutly meditating. After a variety of adventures, however, he arrives at his own castle of Malepardus, before which, in the last group, we behold him inflicting signal punishment on Laprell, the rabbit, for having betrayed him to the king, who naturally showed himself greatly incensed at Reynard's falsehood and duplicity. The fox, however, finally contrives to get out of all his difficulties; and, according to our sage chronicler, he passes the remainder of his days in peaceful prosperity.

Besides this amusing episode of "the fox," M. Ploucquet exhibited two large hunting scenes, such as form the subject of Snyder's pictures; one, an attack of dogs upon a wild boar; the other, a stag pulled down by hounds. These evinced great spirit, and a close study of nature; although, in one or two instances, the action of the limbs and muscles were not minutely correct. These inaccuracies, however, were so few and so slight that they could not be considered to detract from the very great merit which belonged to the whole of M. Ploucquet's exhibition. The process employed by M. Ploucquet in preparing some of his smaller specimens, was to mould the figure of the animal in plaster of Paris, and to stretch the skin upon the model; and it proved most successful. The groups of M. Ploucquet attracted by far the largest share of public attention.

There were twenty-six exhibitors of taxidermy, of whom four received prize medals, and one obtained honourable mention.

ETHNOGRAPHICAL MODELS.

Under this title we shall describe a few collections of small figures illustrative of foreign costumes and manners. These, apart from their excellence as works of art, possessed a very high interest, as conveying, through the eye, a vivid representation of the customs, occupations, and habits of the natives of distant countries, not so easily apprehended from any written description, however well illustrated by drawings. These models were confined to the Court of the Fine Arts, with the Maltese, the Indian, and the Spanish Courts. Those contained in the first-named department attracted by far the largest share of public attention; although in respect of the particular excellence which was there contemplated, they possessed, perhaps, less interest than the very diversified and most extensive series in the Indian Court.

United Kingdom.—The Fine Art Court contained a collection of very beautiful, life-like, and spirited figures, modelled in wax, with most surprising minuteness and artistic feeling, both in the position and grouping. They represented the natives of Mexico, and also the American Indians habited in their proper costume, and displaying their characteristic customs in the several phases of civilized and savage life, with a truthfulness, in the varied expressions and anatomical development of the different effigies, which was most remarkable. An Indian, rejoicing in triumph over the despair of a white victim, whom he had bound and was about to scalp, but whose sufferings he was prolonging with savage cruelty, might be especially cited in illustration of this particular excellence; and the group of three figures, entitled "a confessional," as an instance displaying a rich vein of humour. The *Aquador,* or water-carrier; the *Ramendor,* or street-cobbler, in his tattered garments; the group of civilized Indians, laden with produce; the group of savage Indians, called *Mecos;* the *fandango,* a national dance, illustrated by two Indian women dancing to the guitar, played by a male figure, with numerous other examples which might be adduced, were also all deserving of equal praise.

India.—The figures in the Indian Courts, which were contributed by several exhibitors, were either modelled in clay or plaster, or else carved in wood, and painted to represent the natural colours of the various objects. The largest group, which was contributed by Mr. Mansfield, of the East India Company's Civil Service, was contained in a model of the *Jamma Bundi;* or the encampment of a government collector, whilst moving about on his annual tour through his district. The figures were of plaster, and the buildings of wood. The double-poled tent of the collector was pitched at a short distance from the village; and he was represented as sitting within it, surrounded by the *Mauletdar* and other revenue-officers. Several petitioners were congregated round the door of the tent, soliciting a remission of part of the payments due from them. The figures of men and females and animals were about 300 in number, and presented a lively representation of Indian life and character. Some were indolently lying under the trees, some were gazing at the performance of a snake-charmer, and some feeding an elephant; whilst others, more intent on the business of the day, were having their petitions written out by the village accountants, or *Coolkurnees.* The village near which the encampment was formed, was represented inside a fortified wall which surrounded it, and which was shown in sections. There were also to be seen the numerous shops and rows of houses in the village, with the inhabitants engaged in their various pursuits.

The best executed and most instructive models, however, were those of clay, manufactured in Kisnaghur, representing the various castes and professions of the Hindoos; which collection comprised upwards of sixty illustrations, some consisting of several

MEXICAN INDIAN

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figures. Here, almost in closest juxta-position with splendid cotton-carding, spinning, and weaving machinery, there was to be seen a Bengal woman cleaning cotton with the strung-bow, and another spinning with the most primitive of apparatus; and the weaver preparing his thread on his roughly-made loom. Not far from Nasmyth's steam-hammer, the *Khamar*, or Bengal blacksmith, was represented with his simple bellows, forge, and anvil; and within a very short distance from the latest refinements in agricultural implements and machinery, were illustrations of ploughing and harrowing with apparatus which no European could use, and rice-grinding, that must have required all the patience of an Indian to perform. On a line with the locomotive engines, which convey our correspondence with a celerity not dreamed of a few years since, and even now insignificant in comparison with the lightning speed of the electro-telegraph, were effigies of the *Dawk-runner*, or bearer of the government mail-bags; and the *Dawk-bundy-burdar*, or messenger who carries post-office parcels; and closely watched by the unarmed policeman, were the *Bro-jabassee*, or armed watchman, and the *Chowkeedar*, or village watchman. These were only a few of the groups of this most suggestive and well-executed collection.

Less perfect in point of execution than the Kisnaghur clay figures, but still most interesting, were the models manufactured at Gokak, which it appears are not made as articles of export, but only to order. This collection comprised about forty illustrations, out of which might be especially noticed, as representing trades, the cotton-printer, the potter, the woman grinding meal, the Bengal water-carrier, or *Bheestee*, and the washerwoman or *Dhobie*.

The models illustrating the practices of the Thug murderers, excited the most painful interest, and represented the following incidents: a traveller, induced to sit down and smoke, has his attention directed to the heavens, when the fatal handkerchief is applied by a Thug, who stands behind him; but in another group a horseman was successfully defending himself from an attack on the part of the Thugs, one of whom he had slain. The mutilation of the bodies of the murdered, and their concealment in a well, and the strangling of travellers on horseback and on foot, were also represented. It is stated that some of these Thug murderers, after having been arrested and reclaimed, and domiciled in a school of industry, were the manufacturers of the carpets exhibited in the Indian tent. The other models contained in the Indian Court comprised thirty-five figures in wood from the Rajah of Joudpore; a model of a European court of justice, and also one of a native court; models of a silk factory and an indigo factory, of a native oil mill, and of a farm establishment. A series of male and female figures, exhibited by T. E. J. Boileau, represented the principal sects in Cochin China and Travancore.

Malta.—The figures from Malta, which were modelled in wax, had not the same claims to merit as those before described, but had still a certain amount of excellence. They represented the Grand Master Valetta, the Grand Master Lonzadari, with the Master of the Order of Malta, and a knight, in their proper costume.

Spain.—Three exhibitors contributed models illustrative of the manners and dresses of Spain. Two of these sent figures in painted terra-cotta, representing the inhabitants of Andalusia and Malaga; but the examples were not numerous, though they were remarkable for the beauty and correctness of the modelling. The other exhibitor sent a model of one-half of the interior of the arena for bull-fights at Madrid, made in wood, and containing, it was said, about 4,000 figures, exhibiting the various incidents proper to the place.

The number of exhibitors from various countries was eleven, of these four received prize medals, and one honourable mention.

CHAPTER XXVII.

ALLIANCE OF SCIENCE AND INDUSTRY.

DR. LYON PLAYFAIR—FAVOURABLE RESULTS OF THE GREAT EXHIBITION—COMPARISON BETWEEN ENGLISH AND CONTINENTAL MANUFACTURES—OUR NATIONAL DEFICIENCIES CONSIDERED — CLASSICAL LITERATURE — INFINITY OF SCIENCE — TRUE CAUSE OF BRITISH SUPERIORITY—SCIENCE THE NATURAL DESIRE OF THE HUMAN MIND—OPINIONS OF EOTHEN—CENTRAL COLLEGE OF ARTS AND MANUFACTURES IN PARIS—INDUSTRIAL UNIVERSITY PROPOSED—THE THREE LEARNED PROFESSIONS—INDUSTRY A PROFESSION—SIR H. DAVY ON SCIENCE AND PATRONAGE—QUOTATION FROM LORD BACON—COMPETITION—FUTURE PROGNOSTICS—THE EXHIBITION A SCHOOL OF INDUSTRY, ETC., ETC.

It was a wise and useful suggestion of Prince Albert's, that our most eminent philosophers should be engaged to deliver a series of lectures on the subject of the Great Industrial Exhibition, before the Society of Arts. We have already given copious extracts from the admirable Inaugural Discourse by Dr. Whewell, and we now propose, in the present chapter, to offer a few of equal importance from the no less admirable lecture of Dr. Lyon Playfair. "A rapid transition," observes the learned doctor, "is taking place in industry; the raw material, formerly our capital advantage over other nations, is gradually being equalised in price, and made available to all by the improvements in locomotion: industry must in future be supported, not by a competition of local advantages, but by a competition of intellect. All European nations, except England, have recognised this fact; their thinking men have proclaimed it; their governments have adopted it as a principle of state; and every town has now its schools, in which are taught the scientific principles involved in manufactures, while each metropolis rejoices in an industrial university, teaching how to use the alphabet of science in reading manufactures aright. Were there any effects observed in the Exhibition from this intellectual training of their industrial populations? The official reserve, necessarily imposed upon me as the commissioner appointed to aid the juries, need exist no longer, and from my personal conviction, I answer, without qualification, in the affirmative. The result of the Exhibition was one that England may well be startled at. Wherever—and that implies in almost every manufacture—science or art was involved as an element of progress, we saw, as an inevitable law, that the nation which most cultivated them was in the ascendant. Our manufacturers were justly astonished at seeing most of the foreign countries rapidly approaching and sometimes excelling us in manufactures, our own by hereditary and traditional right. Though certainly very superior in our common cutlery, we could not claim decided superiority in that applied to surgical instruments; and were beaten in some kind of edge-tools. Neither our swords nor our guns were left with an unquestioned victory. In our plate-glass, my own opinion—and I am sure that of many others—is, that if we were not beaten by Belgium, we certainly were by France. In flint-glass, our ancient *prestige* was left very doubtful, and the only important discoveries in this manufacture were not those shown on the English side. Belgium, which has deprived us of so much of our American trade in woollen manufactures, found herself approached by competitors hitherto almost unknown; for Russia had risen to eminence in this branch, and the German woollens did not shame their birth-place. In silversmith work we had introduced a large number of foreign workmen as modellers and designers, but, nevertheless, we met with worthy competitors. In calico-printing and paper-staining our designs looked wonderfully French; whilst our colours, though generally as brilliant in themselves, did not appear to nearly so much advantage, from a

want of harmony in their arrangement. In earthenware we were masters, as of old; but in china and in porcelain our general excellence was stoutly denied; although individual excellencies were very apparent. In hardware we maintained our superiority, but were manifestly surprised at the rapid advances making by many other nations. Do not let us nourish our national vanity by fondly congratulating ourselves that, as we were successful we had little to fear. I believe this is not the opinion of most candid and intelligent observers. It is a grave matter for reflection, whether the Exhibition did not show very clearly and distinctly that the rate of industrial advance of many European nations, even of those who were obviously in our rear, was greater than our own; and if it were so, as I believe it to have been, it does not require much acumen to perceive that in a long race the fastest-sailing ships will win, even though they are for a time behind. The Exhibition will have produced infinite good, if we are compelled as a nation to acknowledge this truth. The Roman empire fell rapidly, because, nourishing its national vanity, it refused the lessons of defeat, and construed them into victories. All the visitors, both foreign and British, were agreed upon one point, that, whichever might be the first of the exhibiting nations, regarding which there were many opinions, that certainly our great rival, France, was the second. Let us hope that in this there is no historical parallel. After the battle of Salamis, the generals, though claiming for each other the first consideration as to generalship, unanimously admitted that Themistocles deserved the second; and the world, ever since, as Smith remarks, has accepted this as a proof that Themistocles was, beyond all question, the first general. Let us acknowledge our defeats when they are real, and our English character and energy will make them victories on another occasion. But our great danger is, that, in our national vanity, we should exult in our conquests, forgetting our defeats; though I have much confidence that the truthfulness of our nation will save us from this peril. A competition in industry must, in an advanced state of civilisation, be a competition of intellect. The influence of capital may purchase you for a time foreign talent. Our Manchester calico-printers may, and do, keep foreign designers in France at liberal salaries. Our glass-works may, and do, buy foreign science to aid them in their management. Our potteries may, and do, use foreign talent both in management and design. Our silversmiths and diamond setters may, and do, depend much upon foreign talent in art and foreign skill in execution; but is all this not a suicidal policy, which must have a termination, not for the individual manufacturer, who wisely buys the talent wherever he can get it, but for the nation, which, careless of the education of her sons, sends our capital abroad as a premium to that intellectual progress which, in our present apathy is our greatest danger?

"It is well to inquire in what we are so deficient, and what is the reason of this deficiency. Assuredly it does not consist in the absence of public philanthropy or want of private zeal for education, but chiefly rests in that education being utterly unsuited to the wants of the age. In the thirteenth and fourteenth centuries, classical learning was, after its revival, highly esteemed; and its language became the common medium for expression in all nations. A thorough acquaintance with it was an absolute necessity to any one with pretensions to learning. It had a glorious literature, one as fresh as when it grew on the rich soils of Rome and Greece. Its truths were eternal, and were received by us in their traditional mythology, as Bacon beautifully says, like "the breath and purer spirit of the earliest knowledge floating to us in tones made musical by Grecian flutes." And why was that bewitching literature made the groundwork of our educational systems? Does it not show that literature, like art, may have a standard excellence; and that we are content to imitate where we cannot surpass. If the main object of life were to fabricate literati, I would not dispute the wisdom of making classics

the groundwork of our education. They are not utterly dead, but, like the dry bones of the valley, they may come together, and have breathed into them the breath of life. In the world there is a constant system of regeneration. Theories exist for a time, but like the phœnix, are destroyed, and rise yet more glorious from their ashes. Animals die, and by their decay pass into the atmosphere, whence vegetables derive their nutriment, and thus death becomes the source of life. But in all this there is no incongruity. A phœnix does not from its ashes produce an eagle, but a phœnix as before. The dry bones of dead literature may vivify into new forms of literary life. Classical literature and exact science, are, however, wholly antithetic. If classical literature be sufficient to construct your spinning-jennies and bleach your cottons, your system of instruction is right; but if you are to be braced, and your sinews strengthened for a hard struggle of industry, is it wise that you should devour poetry, while your competitors eat that which forms the muscles and gives vigour to the sinews? With such different trainings, who in the end will win the race? Science has not, like literature and art, a standard of excellence. It is as infinite as the wisdom of God, from whom it emanates. All ordinary powers decrease as you depart from the centre; but the power of knowledge augments the farther it is removed from the human source from which it was transmitted. God has given to man much mental gratification in trying to understand and apply to human uses His laws. The great philosopher of scripture has said, "It is the glory of God to conceal a thing, but the honour of kings to search out a matter." The poet-prophet of the Bible has also told us, that God "turneth wise men backward, and maketh their knowledge foolish." And, therefore, as surely as He is infinite and man finite, until earth passes away, you will have no human standard of scientific knowledge. As this is so, how can we as a nation expect to carry on those manufactures by our sons of industry, when we do not teach them the nature of the principles involved in their successful prosecution? Solace ourselves as we will with vain thoughts of our gigantic position among nations—Greece was higher than we are, and where is she now? It does not require a lofty stature to see the farthest; for a dwarf on the shoulders of a giant sees farther than the giant,—not that he is less a dwarf, but that he has added the giant's height to his own. The Exhibition showed us many small states which had thus raised themselves on the shoulders of science within the last few years, while we are merely hovering about its skirts. Let us take care that our excess of pride in the so-termed "practical" power of our population may not be punished as Arachne was of old. Arachne was wonderfully skilled in needlework, but presumptuously challenged Minerva to a trial of skill. What chance was there in such an unequal contest? Minerva united science to her handicraft skill, and this combination insured success. Arachne was justly cast from her proud position among mortals by being changed into a spider, ever spinning the same web in the same way,—the same for wintry blasts as for gentle summer zephyrs.

"'You have excelled all other people in the products of industry. But why? Because you have assisted industry by science. Do not regard as indifferent what is your true and greatest glory. Except in these respects, in what are you superior to Athens and Rome? Do you carry away from them the palm in literature and the fine arts? Do you not rather glory, and justly too, in being, in these respects, their imitators? Is it not demonstrated by the nature of your system of public education and by your popular amusements? In what, then, are you their superiors? In everything connected with physical science; with the experimental arts. These are your characteristics. Do not neglect them. You have a Newton, who is the glory, not only of your own country, but of the human race. You have a Bacon, whose precepts may still be attended to with advantage. Shall Englishmen slumber in that path which these great men have opened,

and be overtaken by their neighbours? Say, rather, that all assistance shall be given to their efforts; that they shall be attended to, encouraged, and supported.' "—*Davy.*

"All the aspirations of youth are towards science, especially that depending on observation, but we quench the God-born flame by 'freezing drenches of scholastic lore.' In the language of 'Eothen,' 'You feel so keenly the delights of early knowledge! You form strange mystic friendships with the mere names of mountains, and seas, and continents, and mighty rivers; you learn the ways of the planets and transcend their narrow limits, and ask for the end of space; you vex the electric cylinder till it yields you, for your toy to play with, that subtle fire in which our earth was forged. You know of the nations that have towered high in the world, and the lives of men who have saved whole empires from oblivion. What more will you ever learn? Yet the dismal change is ordained, and then, thin meagre Latin (the same for everybody) with small shreds and patches of Greek, is thrown, like a pauper's pall, over all your early lore; instead of sweet knowledge, vile, monkish, doggrel grammars and graduses, dictionaries and lexicons, and horrible odds and ends of dead languages, are given you for your portion, and down you fall from Roman story to a three-inch scrap of '*Scriptores Romani*'—from Greek poetry, down, down, to the cold rations of '*Poetæ Græci,*' cut up by commentators and served out by schoolmasters.' Is this horrible quenching of all our youthful innate love of God's truth, the education for the youth of a nation, depending for its progress on their development? How is it possible that dead literature can be the parent of living science and of active industry?

"I need not explain myself as meaning that our youthful aspirations point to science as a fit means for developing our intellectual capacities, and that boyhood is scarcely the time rudely to exercise all our longings for an acquaintance with the wisdom of creation, or to cramp and torture the mind by the acquisition of dead languages to the exclusion of all other knowledge. In quoting the beautiful language of '*Eothen,*' I intend only to express the violence done to our natural instincts, and not to question the excellence of the means employed in teaching classics. It would ill become me, or any one, to speak disparagingly of the wisdom to be derived from a study of ancient authors, or to deny the immense importance of a knowledge of classical literature to education generally; nor should I like to see that education confined to stern realities, divested of the graces and poetry of polite literature. But I do, at the same time, vehemently protest against the exhaustion of all our youthful years by a mere classical tuition, especially in the case of that large class of the community who, by their exertions in industry, have confided to them, in a great degree, the prosperity of their country. As I do not think the teaching of classical literature, as practised in our schools, to be worthy of the name of education, neither do I apply that title to the communication of scientific knowledge alone—and you will observe that I have always spoken of it by the term 'instruction.'—I am propounding no scheme of education, but strongly insisting that instruction in science should form an important part of the education of our youth.

"Do not conceal from yourselves that this is the vital difficulty of the question. You may, and I hope will, soon raise an Industrial University; but this should have its pupils ready trained before it adopts them. Now, it must from itself act downwards, instead of working from the schools upwards. Until our schools accept as a living faith that a study of God's works is more fitted to increase the resources of the nation than a study of the amours of Jupiter or of Venus, our industrial colleges will make no material headway against those of the continent. In Paris we find a Central College of Arts and Manufactures, into which the students enter at an average age of nineteen years, already well trained in the elements of science, and going there to be taught how

to use these elements for industrial application. Three hundred of the best youth of France are annually receiving at this college the most elaborate education; and the best proof of its practical value is the great demand among manufacturers for its pupils, a diploma from it being equivalent to assured success in life. Can you wonder at the progress making by France in industry, when she pours every year an hundred and fifty of these highly educated manufacturers into her provinces? A similar education to this is going on in almost all parts of Europe; but in England only one such institution exists. We have our University and King's College, it is true, and they are productive of much good, and similar colleges exist in Scotland and Ireland; but their instruction in science terminates just where the industrial colleges of the continent begin. In fact, the latter would be supplementary and a great support to the former. Government, acting on its own perception of right, in its first national recognition of these truths, now happily dawning on England, has established a school of mines; and the experience of this has shown that it is much appreciated, although it labours under the disadvantage of the want of a preliminary education in its pupils—compelling its professors, in its commencement, to be more elementary in their instruction than is well compatible with the proper objects of such a school. Now, while I urge the impolicy of a mere classical instruction to the youth of this country with all the expression which I can give to a matured conviction, do not suppose that I would wish to put all our youth in one Procrustean bed. I again allege, that it is the present system which follows this singular love of uniformity, and clips or extends the dimension of each youth to one common standard. It is against this very confined system that I protest. I think the glorious wisdom displayed in creation, even in the limited extent to which we are permitted to behold it, forms no unapt means of leading man to a worship of its Creator; and, sympathizing as I do to the utmost in our educational endeavours to unite and not to dissever the acquirement of knowledge from that of religion—a union which, I think, is at once the glory, the pride, and the peace of England—I cannot perceive how the mere teaching of profane literature can tend to this end in any degree, so much as the reverential teaching of God's wisdom displayed in His works; especially when every step in advance of this knowledge produces a social amelioration of the human race. But, while I should regret to see our colleges retrograde one step in their teaching of classical literature, it is truly lamentable that Oxford and Cambridge so little encourage the sciences; for, until the colleges throw open their widest portals to these, the schools in the country, deriving their life from them, will do little to reform the present vices of a limited and exclusive education.

In this country we are, in many respects, remarkably unchangeable. Three professions—the church, the law, and medicine, were supposed, some centuries since, to represent learning, and, with a wonderful blindness, they are still accepted as all-sufficient. Industry, to which this country owes her success among nations, has never been raised to the rank of a profession. For her sons there are no honours, no recognised or social position. Her native dignity, if tacitly understood, has never formally been acknowledged. Science, which has raised her to this eminence, is equally unrecognised in position or honours, and, from her very nature, cannot attain the wealth which in industry solaces the absence of social position. This restriction of learned honours to three recognised professions has a lamentable effect both on the progress of science and of industry. Its consequence is, that each profession becomes glutted with ambitious aspirants, who, finding a greater supply than demand, sink into subordinate positions, becoming soured and disappointed, and therefore dangerous to the community. Raise industry to the rank of a profession—as it is in other countries—give to your industrial universities the power of granting degrees involving high social recognition

to those who attain them, and you will draw off the excess of those talented men, to whom the church, the bar, and medicine, offer only a slender chance of attaining eminence; and by infusing such talent into industry, depend upon it, the effects will soon become apparent. In foreign countries professions involving social rank and position arise with their requirements; in our nation we are content with a meagre classification, scarcely sufficient for the middle ages, and not even a reflection of our present wants. These considerations are not mean ones, for, as long as ambition exists in the human mind, their good or bad adjustment will exercise a beneficial or pernicious influence on society.

"In the establishment of institutions for industrial instruction, you, at the same time, create the wanting means for the advancement of science in this country. I have alluded in this lecture, and have shown in another, that the progress of science and of industry in countries which have reached a certain stage of civilisation ought actually to be synonymous expressions; and hence it follows that it is essentially the policy of a nation to promote the one which forms the springs for the action of the other. I think it, therefore, no mean advantage to this nation, that the establishment of industrial colleges will materially aid the progress of science by creating positions for its professors and for those who would willingly cultivate science, but are scared from it by the difficulties they have to encounter in its prosecution. The great Davy says, 'Science, for its progression, requires patronage; but it must be a patronage bestowed, a patronage received with dignity. It must be preserved independent. It can bear no fetters; not even fetters of gold; and, least of all, those fetters in which ignorance or selfishness may attempt to shackle it. And there is no country which ought so much to glory in its progress, which is so much interested in its success, as this happy island. Science has been a prime cause of creating for us the inexhaustible wealth of manufactures; and it is by science that it must be preserved and extended. We are interested as a commercial people—we are interested as a free people. The age of glory of a nation is likewise the age of its security. The same dignified feeling which urges men to gain a dominion over nature will preserve them from the dominion of slavery. Natural, moral, and religious knowledge are of one family, and happy is the country and great its strength where they dwell together in union.' Let me quote, also, from the immortal Bacon on this point—who, as lord chancellor, when he wrote could not be actuated by personal ambition,—'And as founders of colleges plant and founders of lectures water, we must next note a defect in public lectures, whether in arts or professions, viz., the smallness of the salary generally assigned them, for it is necessary to the progress of the sciences that lecturers be of the ablest kind, as men intended for propagating the sciences in future ages and not for transitory use. And this cannot be, unless the profits content the most eminent in every art to appropriate their lives and labours to this sole purpose, who must, therefore, have a competency allowed to them proportionable to what might be expected from the practice of a profession. For, to make the sciences flourish, David's military law should be observed—"that those who stay with the stores have equal with those who are in the action," or otherwise the stores will be ill-attended; so lecturers in the sciences, as being the guardians of the stores and provisions, whence men in active life are furnished, ought to share equal advantages with them; for, if the fathers of the sciences be weak or ill-maintained, the children will feel the effect of it.' I will not weaken this admirable opinion of Bacon by any remark of my own, for I believe it to contain the real cause of the low state of science in England. But, lest you should think my views partake too much of the *argumentum ad sacculum*, I will protect myself under the caustic wit of Diogenes, who, on being asked, 'How it happened that philosophers followed the rich and not the rich the philosophers?' answered, 'Because the philosophers know what they want, but the rich do not.'

"I must now conclude this lecture, already much too long, and I do so by once more recalling to your minds its general argument. Chemistry, viewed here as a type of science generally, has exercised immense influence upon manufactures, having increased human power, economised human time, and communicated important values to bodies apparently the most worthless. Foreign states have acknowledged the fact, that successful competition can only be attained by an attentive study of science—by making their sons of industry themselves disciples of science. England, except in one instance, has hitherto not recognised this truth as a principle of State, and hence her science languishes, and her capital has to import from other lands. This points to the necessity of the establishment of industrial colleges; but it implies, at the same time, an adaptation of juvenile education to the wants of the age. All this impresses itself upon my mind with a conviction as strong as that the glorious sun sheds its light-giving rays to this naturally dark world of ours. May the Exhibition be the means of raying forth this truth to our darkening industry! Do not dream of that Exhibition as a thing of the past; rather think of it as a glorious emblem of the future. When Neptune and Minerva disputed as to who should name the capital of Cecropia, the gods resolved that the right should be given to the one who granted to man the greatest benefit. Neptune struck with his trident the earth, from whence sprung a war-horse; while Minerva produced an olive-tree. England, though sharing with Neptune the empire of the sea, ratified the decision of the gods by rearing the emblem of peace. The Exhibition has been an olive-tree, the branches of which have now been spread among all nations, and success for the future will depend upon the care and wisdom with which they are tended, so as to grow into goodly trees. Do not let us, by severing industry from science, like a tree from its roots, have the unhappiness of seeing our goodly stem wither and perish by a premature decay; but, as the tree itself stretches out its arms to heaven to pray for food, let us, in all humility, ask God also to give us that knowledge of His works which will enable us to use them in promoting the comfort and happiness of his creatures. Our duties in this respect are clearly indicated in the motto of our catalogue:—

'HUMANI GENERIS PROGRESSUS
EX COMMUNI OMNIUM LABORE ORTUS,
UNIUSCUJUSQUE INDUSTRIÆ DEBET ESSE FINIS:
HOC ADJUVANDO,
DEI OPT: MAX: VOLUNTATEM EXSEQUIMUR.'"

THE EXHIBITION AS A SCHOOL OF INDUSTRY.

To pursue the difficult question of the tendency of mechanical production, and the influence of increased facilities upon the condition of the workman, would involve us in a greater length than we propose in this present chapter. Unquestionably, the immediate results are often suffering and hardship to individual workmen, and often to a whole trade. But we cannot quite address ourselves to the logic of arguments, that improved modes of production, which confessedly place the article within the reach of a greater number, are to be retarded, in order to benefit a minority; that the course of science is to be checked; that knowledge is baneful; and that either particular modes of production, or particular habits and manners in men, are to be kept up solely for the existence of particular trades and particular classes of artisans. Moreover, those who enter into these arguments are prepared to show, that the social machine rights itself in a much shorter time than might have been anticipated. We well recollect the fearful prognostications at the commencement of the railway system. Caricatures of distracted innkeepers and delighted horses were to be seen; and what was shown in caricature was true at least for the time, as to the innkeepers. The coaching glories of Lichfield,

Northampton, and St. Alban's, passed to places which had been too small to dread railways; new towns rose with wonderful rapidity, and the old became melancholy and deserted. We need not tell what every one knows; though let the artisan class bear in mind, that from the development of the railway system a great amount of new employment has been gained, and families once struggling against reverse of fortune are now contented and happy. And if we say the very innkeepers and horses had soon more to do than ever before, and that towns which had rejected railways got looped in, bitterly lamenting, then we shall have simply told the story of the last sixteen years. But the moral we cannot omit. It is, that the antidote to these temporary hardships must be supplied by education, by the development of mind in the workman; and for this antidote, the means existed in the Exhibition. By debasing the workman to a mere machine, it has followed necessarily that the human machine was superseded, sooner or later, by the superior mechanism which springs from mind. Immediate advantages of concentration of attention and subdivision of labour were the limitation; and it may not unreasonably be inferred, that the recent prevalence of insanity even has been the result. Improved education, and the development of mental energy, would not only lead to the discovery of new sources of employment, indispensable in a state of progress, but would, at the same time, substitute an honest pride and pleasure in the perfect execution of even mechanical work; the increasing want of which is a main cause of the inferiority of many works of art, and a constant source of annoyance to architects, and loss in buildings to the public. From the brickwork and joiner's work, or ironmongery in a house, down to a chair or an umbrella, lowness of price without the asserted durability, is universal; and the ingenuity, and even pleasure, which both dealers and workmen evince in the practice of a deception, is equalled by the readiness of the public to deceive themselves. As we cannot grasp the reasoning of a Chancellor of the Exchequer, that because chicory is sold, coffee has been available to a class which had not before used it, so we regret the prevalence of the delusion which exists in buildings as in every other commodity. Many amongst the class of building artisans appear to disregard directions as to work, for the mere pleasure of practising a deceit. For this pleasure, we must substitute the pride of producing a good work, and this antidote, we repeat, was to be found in the Exhibition. We could have hoped that the influence of the Exhibition would have been exerted in the removal of a delusion before referred to, namely, that expense and elaborate work are indispensable to the production of beauty. Beautiful, indeed, and suggestive as were many of the objects of the Exhibition, there appears to have been an entire absence of that cheap beauty which would be within the reach of all classes. The attainment of this object would have been the more desirable, since recent attempts to extend the influence of art, in association with objects of decoration and utility, have fostered rather than discouraged the delusion, and so have not advanced the objects of those who have made them. What has to be done, in fact, is to invest every form of utility with the attributes of art, and this alike from the most elaborate work of architecture, to the least important article of furniture, or the meanest utensil. Certain principles which have to be kept in view are alike in all these cases. They correspond with those which the most enlightened artists are endeavouring to bring to the regeneration of architecture; they are in many respects distinct from those which determine the forms of painting and sculpture, and, perhaps, have never yet been accurately perceived and exemplified in the architecture of any age. They depend, indeed, upon the constant recognition of the fact, that the reason must be satisfied as well as the eye delighted; and the want of this recognition is the great fault in the numerous designs for decorative objects, now held up to notice as excellent works of art. We think that the late Exhibition has afforded us the means not only of contributing to the advancement of

architecture, but of placing it in a position in which it has never yet stood; but there are particluar circumstances in connexion with manufactured art which should be guarded against, although not precisely in the manner urged by those who deny the value of multiplication of copies. As for the collection of grates, ironmongery, furniture, and all those objects which afford interest to the architect, they could not be viewed without advantage—since the greatest difficulty is often felt in obtaining knowledge of the existence of particular inventions and contrivances. As a complete collection of these things, the Exhibition was, of course, not to be regarded. It is from the uses of the Exhibition, on which we have dwelt above, that its chief value will be felt.

CHAPTER XXVIII.

DECORATIVE FURNITURE AND UPHOLSTERY, PAPER-HANGING, ETC.—*Juries' Reports.*

CABINET FURNITURE, EARLY ACCOUNT OF—ITALIAN, FRENCH, GERMAN, AND ENGLISH WORK—FIRST INTRODUCTION OF MAHOGANY—MARQUETERIE INLAY—TARSIA-WORK—BUHL INLAY—MOSAIC INLAY—PARQUETERIE—PORCELAIN INLAY—MECHANICAL ACTION IN CABINET WORK—BILLIARD-TABLES—DECORATIONS—IMITATIONS OF WOODS AND MARBLES—PAINTED BLINDS—WAX-CLOTH HANGINGS—PAPER-HANGINGS, VARIOUS KINDS—MODE OF MANUFACTURE—MODE OF PRINTING—BEAUTIFUL SPECIMENS OF LANDSCAPE PAPERS, ETC.

It is important, both for strength and good effect of furniture, that the principles of sound construction be well carried out; that the construction be evident, and that, if carving or other ornament be introduced, it should be by decorating that construction itself, not by overlaying it and disguising it. It is not necessary that an object be covered with ornament, or be extravagant in form, to obtain the element of beauty: articles of furniture are too often crowded with unnecessary embellishment, which, besides adding to their cost, interferes with their use, purpose, and convenience. The perfection of art manufacture consists in combining, with the greatest possible effect, the useful with the pleasing; and the execution of this can generally be most successfully carried out by adopting the simplest process.

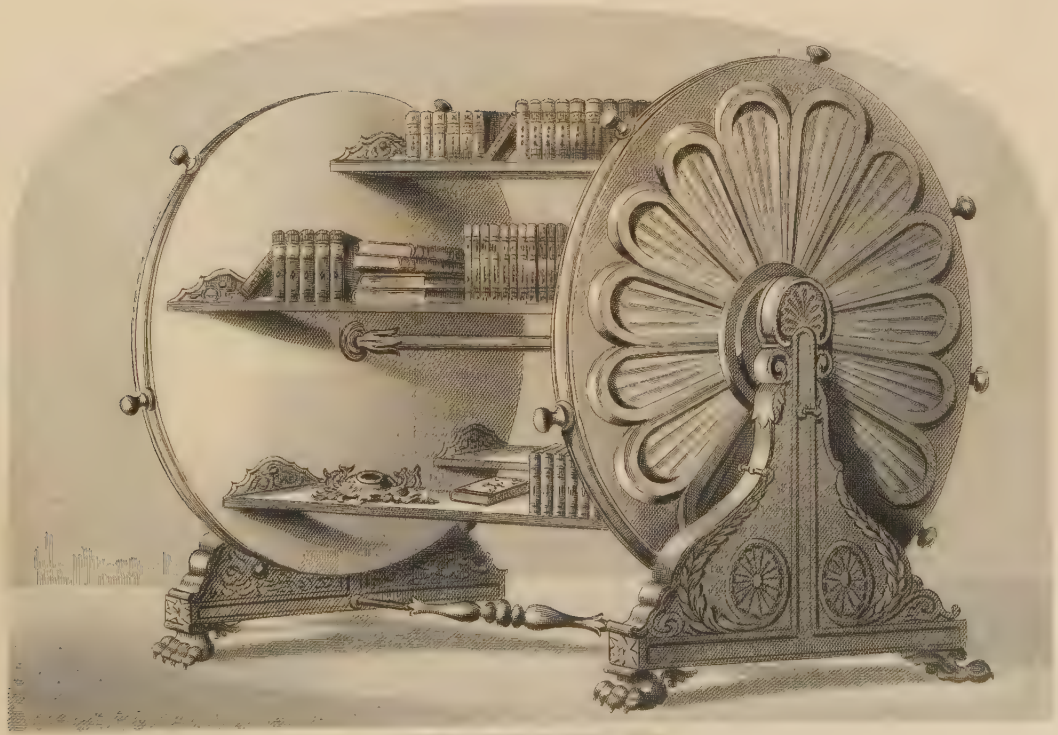
The jury, though fully sensible of the great beauty of many of the ornamental works in furniture collected at the Exhibition, yet regret that there have not been more specimens of ordinary furniture for general use; works whose merits consist in correct proportion, simple but well-considered design, beauty of material, and perfect workmanship. Few have the means of purchasing such beautiful works as the sideboard of M. Fourdinois, or the cabinets of M. Ringuet-Leprince, which come almost under the head of fine art, rather than of manufacture; and it is much to be desired that attention be directed towards improving the taste of those more ordinary objects that come into daily use by the many.

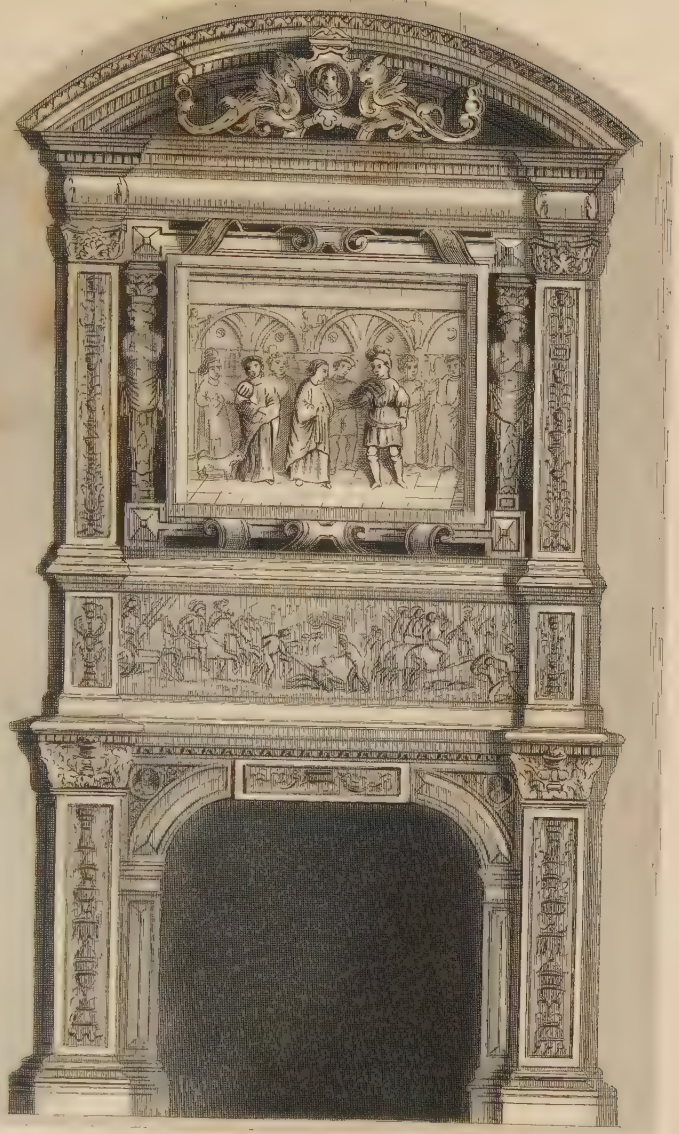
Cabinet furniture first became an article of general luxury about the beginning of the sixteenth century. At this period inlaid, as well as richly-carved furniture, was manufactured in Italy, and exported to various parts of Europe. Among the works exhibited by Italy, some were distinguished by great excellence, particularly in the carved examples. M. A. Barbetti, from Florence, exhibited a casket of great merit, most elaborately carved, introducing bas-reliefs of figures, ornaments, chimeras, &c. A large cheval-screen frame, by Luigi Marchetti, of Sienna, was very beautifully wrought with delicate ornaments, of

Engraved by C. Greatbach, from a Drawing by H. Mason

THE COMPANION CHAIR

FOR THE CENTRE OF A DRAWING ROOM FOR SIX PERSONS





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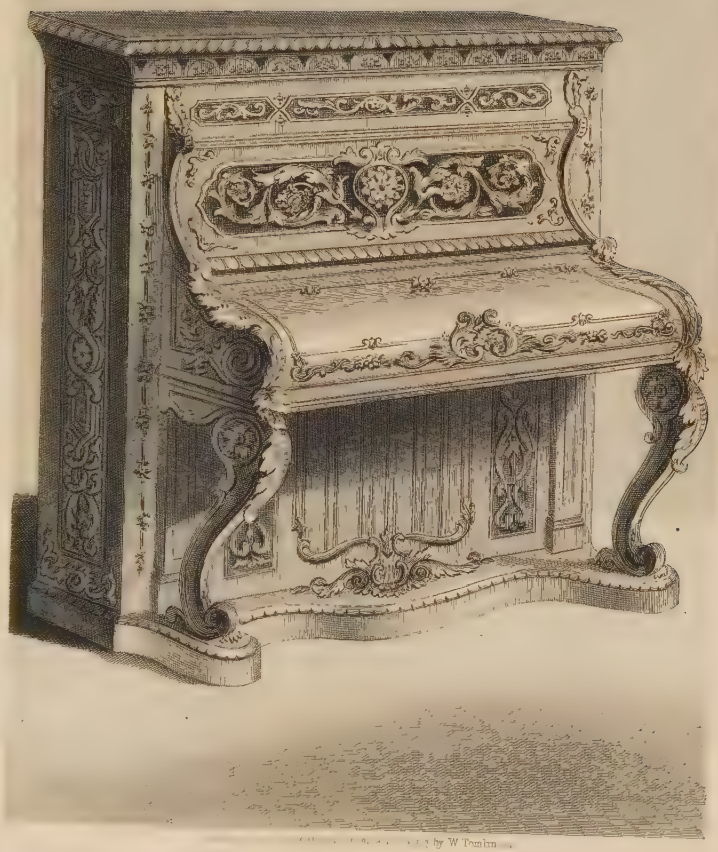

PIANOFORTE

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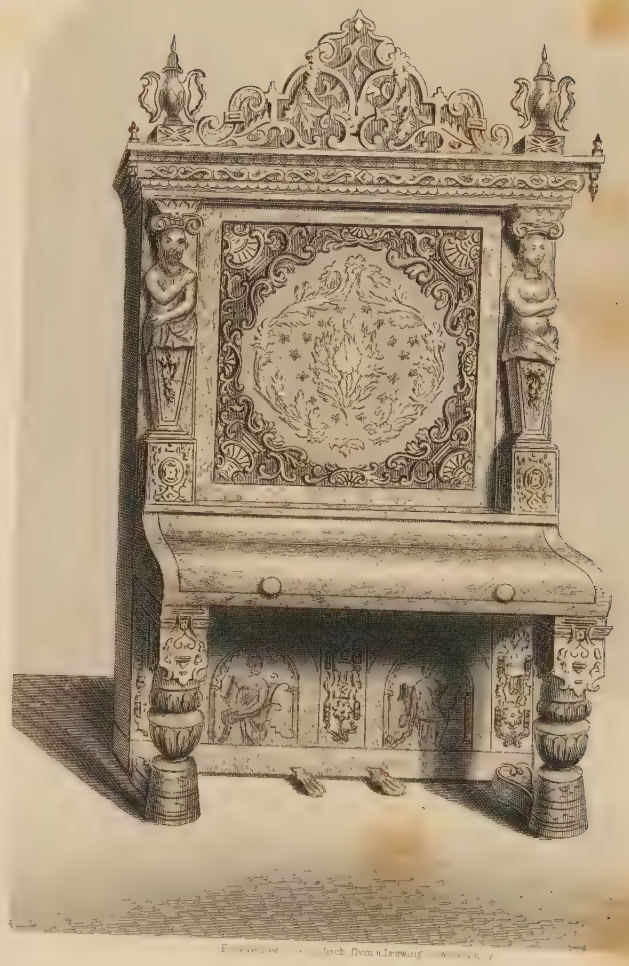


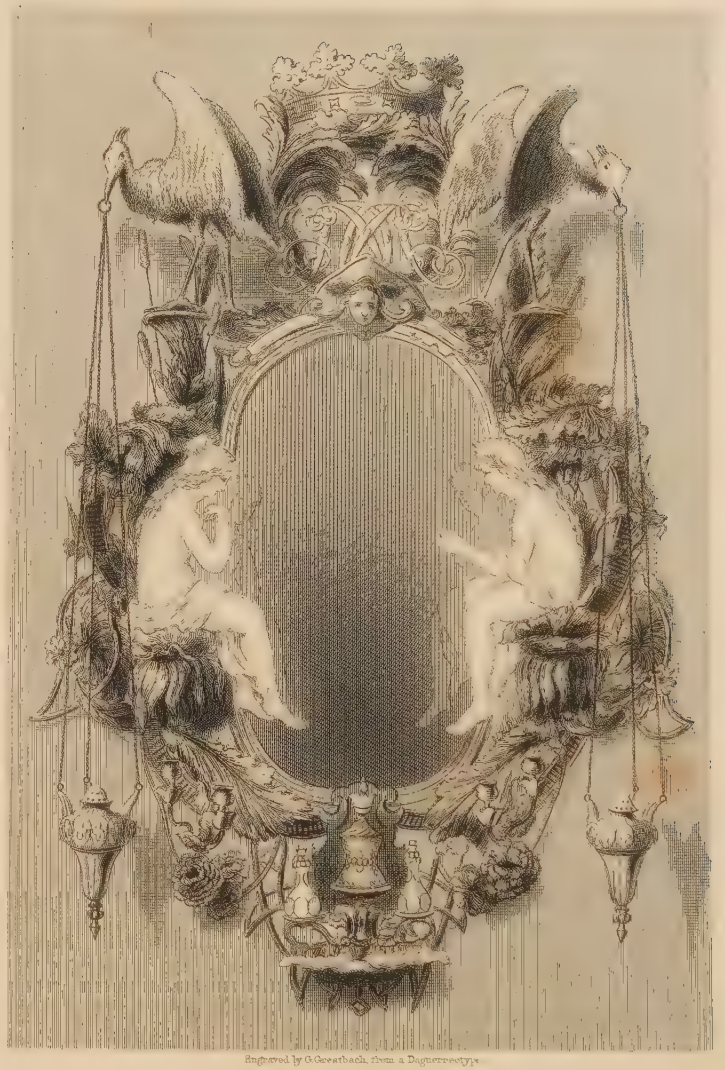
PIANOFORTE - ELIZABETHAN STYLE

MANUFACTURED BY W. JENKINS & SON.

Engraved by G Greatbach from a Daguerreotype

WALNUT WOOD CABINET.

MANUFACTURED BY HANSON & SON, OXFORD STREET.



Engraved by G.Greatbach, from a Daguerreotype.

MIRROR FRAME IN BRONZE.

W. POTTS BIRMINGHAM

good taste. An oval medallion frame, by Pietro Guisti, was also a fine specimen of carving. M. B. Capello, of Turin, exhibited a very elegant inlaid table, a currule chair, and a pedestal—all ornamented in very pure taste, in the Etruscan style, and of good execution.

In France, ornamental cabinet work had acquired considerable reputation in the time of Louis XIV. Its manufacturers have, since then, continued to produce works of great beauty, and have brought the art of marqueterie inlay to a high state of perfection: this work consists in inlaying woods of a great variety of tints, in the form of flowers, ornaments, &c.; and was greatly advanced, in the last century, by Reisner, who produced very beautiful specimens. In buhl-work, also, wherein metals are inlaid upon grounds of tortoiseshell or ebony, or *vice versa*, the French have greatly excelled. This kind of ornamental inlay takes its name from M. de Boule, a celebrated French cabinet-maker, in the time of Louis XIV.

In Germany there has long been established cabinet-work of a high class, more especially for those exquisite ebony cabinets, inlaid with precious stones, and various woods and metals, surmounted with carved figures, and elaborately fitted with innumerable drawers and with perspective recesses—presents fit for kings and princes; of these an excellent example was presented in the ebony cabinet of M. Gröger, of Vienna, a most beautiful work, exquisitely finished. Cabinet-work, of a more useful description has been carried to a high state of perfection in Great Britain, whose manufacturers have studied to produce objects in which the prominent excellence is substantial quality and finished workmanship. It was in England that mahogany, now so generally used, was first employed for cabinet furniture, about 1720. Dr. Gibbons, an eminent physician, having had some planks of this wood given to him by his brother, a West-India captain, who had brought them in his vessel as ballast, wished to use them for a house he was building, in King-street, Covent-garden; but the carpenters complained that the wood was too hard; it was therefore laid aside as useless. Soon after, Mrs. Gibbons wanted a candle-box, and the doctor called in his cabinet-maker, Mr. Wollaston, to make him one of this wood, then lying in the garden. He also declared that it was too hard. The doctor said he must get stronger tools. The candle-box was completed and approved, insomuch that the doctor then insisted on having a bureau made of the same wood, which was accordingly done; and the fine colour, polish, &c., were so pleasing, that he invited his friends to come and see it. Among them was the Duchess of Buckingham. Her grace begged some of the same wood from Dr. Gibbons, to make a bureau for her also; on which the fame of mahogany and Mr. Wollaston was much raised. The wood became the fashion, was much admired, and from that time has continued to be used for furniture more than any other. It will not be possible to give a description of the various details of the manufacture of cabinet-work; but an account of some of the more ornamental processes and results connected with it may be desirable. Of these the marqueterie inlay is one of the most beautiful and interesting. In this work the design, having been first drawn on paper, and properly coloured, is pricked with a fine needle, so that the outline of the ornament or other objects can be pounced on the various coloured woods proposed to be employed; these outlines being carefully marked in, are cut with a fine watch-spring saw, worked in a lathe; in most cases the wood forming the ground is cut with that forming the ornament, so that a piece cut out of white wood corresponds exactly, in shape and size, with the opening left in black wood, in which it therefore fits, and forms the required pattern.

Tarsia-work, or the art of inlaying woods, had been practised from a very early date in Italy, and extensively employed in the decoration of wall-panelling; and remains of this kind of work, revived by Fra Giovanni di Verona, in the fifteenth century, still exist in some of the Italian churches. The earlier specimens of this work were executed in

woods of different shades, but natural hues; afterwards, when flowers, birds, and coloured ornaments were introduced, various stained woods were employed; these, in most cases, have the disadvantage of fading, but in the admirable specimens of marqueterie inlay exhibited by M. Cremer, of Paris, the woods were stained by the process of M. Bouchenè, which gives them a permanent dye to a considerable depth. Notwithstanding, however, the beautiful effect of this work, it is desirable to adopt, as far as possible, the employment of woods of natural hues, as being more harmonious and more consistent with the nature of the work. In those ornaments which are shaded, the effect is given by immersing the pieces in hot sand. The various parts being cut, one of the required tints in the proper form are then placed according to the design, and fixed on paper; afterwards they are applied, like veneer, to the piece of furniture: being mounted, they are cleaned off, and slightly polished, and the finer lines are then engraved. Buhl inlay is manufactured by exactly the same process, only that metals, tortoiseshell, and ebony, are here the materials employed; the nature of the design is somewhat different, depending more upon simple outline forms. There were many beautiful specimens of this kind of work in the Exhibition, more particularly the cabinets of M. Fortner, of Wurtzburg, Bavaria, where the figures and ornaments were designed and finished with infinite taste and skill. There is another kind of inlay applied to furniture, which may be called Mosaic inlay. The beautiful boxes made in India gave some good specimens of this work, in ivory and metal, equalled, however, by the inlaid furniture and boxes of M. Marcelin, of Paris. The extraordinary table of Senor Perez, of Spain, gave a fine example of this style of work, executed entirely in minute portions of wood; the same principle was carried out in a table, by Nye, of Tonbridge Wells. Where the patterns assume geometric forms, this kind of work is executed by laying together slips of wood or metal, &c., in the particular forms required; these united slips are then cut transversely, and affixed to the grounds as in marqueterie. Immediately connected with inlaid cabinet-work is the manufacture of parqueterie, for floors; in this work the same principle is carried out as in marqueterie, only on a bolder scale: woods of different colours are cut to pattern, and inlaid one in the other, or so arranged as to produce very beautiful effects for floors. The specimens exhibited of MM. Couvert and Lucas, and M. de Keyn, of Belgium; of MM. Leistler and Son, of Vienna; and of Mr. Miller, of Russia, showed the perfection to which this art has been brought.

A very beautiful novelty at the Exhibition was the introduction of porcelain inlaid in furniture, like marqueterie, by Messrs. Rivart and Andrieux; in these examples, not only were panels of porcelain inserted, but the painted flowers were cut to form, and inlaid like the ornamental woods. In the cabinet of Mr. Dowbiggin, of London, porcelain, of a very high class of art, was mounted in the panels and pilasters; and M. Gambs, of St. Petersburg, contributed a cabinet in tulip wood, mounted in or-molu, containing beautiful panels in porcelain. M. A. E. Ringuet-Leprince introduced carvings of ivory, mounted with or-molu, on one of his cabinets, with excellent effect; and in his most beautiful ebony cabinet for medals, relieved with exquisite carvings, fine stones were inlaid so as to form part of its decoration. Many of the pieces of furniture owed much of their attraction to the metal ornaments with which they were mounted; but the ebony cabinet of M. Barbedienne combined, in the very element of its construction, bronze ornaments and figures, of a high class of art, so arranged as to form one united whole. Of the carved furniture in the exhibition we have already given ample description: we shall therefore pass over to another branch of cabinet-work, which merits particular notice—that in which mechanical action is introduced; the specimens exhibited by MM. Daubet and Daumaret, of Lyons, were most ingenious and curious; in their secretaire, which was full of contrivances, one key

unlocks all the drawers. These run in the most easy and perfect manner, if touched in the slightest degree; and the closing of one particular drawer shuts and fastens all the others. M. Krieger, of Paris, also exhibited some furniture of excellent mechanical action, such as card-tables, toilets, &c.; and M. Von Hagen, of Erfurt, had a cabinet of fine workmanship, in which the secret mechanism was skilfully carried out. In the Austrian collection were some curious chairs and furniture, by M. Thouet, of Vienna, in which the wood, inlaid with metal lines, was bent to the required forms, without the usual framing. Many excellent billiard-tables were exhibited: in one, by M. Bouhardet, of Paris, the carving was of very beautiful design; another, by M. Knill, of Vienna, was handsomely mounted in buhl inlay; and the inlaid cues of this manufacturer were very beautiful specimens. The billiard tables of Messrs. Thurston, and of Messrs. Burroughs and Watts, of London, were of simpler construction, but solid, and of excellent workmanship.

Decorations.—The specimens exhibited under this head were decorations for walls and ceilings, imitations of woods and marbles, and painted blinds. Several of the ceilings under the galleries of the exhibition building were decorated with more or less taste, principally in the Arabesque style. One, painted by Signor Montanari, of Milan, in one of the Austrian departments, deserved particular notice: it was a carved ceiling, executed with great breadth of effect. The imitation of gold was excellent, and the general treatment was full of spirit and force. In wall decoration Mr. Morant exhibited a handsome panel, mounted with gilt ornaments and mouldings; the latter upon a ground of looking-glass. In the centre of the panel was painted a figure, surrounded by foliage Arabesque. Mr. Moxon's panelling, over a chimney-piece by Mr. Thomas, in the English furniture court, was a tasteful specimen of decoration; and the imitations of woods and marbles, by this gentleman, were executed in a very superior manner, united with an ornamental character of a high class. Messrs. Holland, of Warwick, exhibited table-tops in imitation of marbles, ornamentally arranged in the old Italian style, with good effect. Mr. Kershaw's imitations of woods were also very excellent; and those by Messrs. Nicoll and Allen, of wood and marble, had also considerable merit. Some of these imitations of wood were painted on glass, the polished surface of which gave great finish to the work. Among the painted blinds, those by M. Bach Peres, of Paris, were considered good specimens. The wax-cloth hangings, by M. Vivet, of Paris, were painted ornamentally in the style of Francis I., and were stated to be so prepared as to resist the effects of moisture.

Paper-hangings.—Paper-hangings form a manufacture of considerable importance, carried on in most of the principal cities of Europe, employing many artists and designers, and thousands of operatives; consuming also vast quantities of paper, colours, wool, and metal. They are important, also, because they may be made the means of extensively diffusing taste for art; and, from the low price of the cheaper kinds, enabling the humblest mechanic to give to his home an air of elegance and comfort. It is difficult to determine the period when paper-hangings were invented. They are supposed to have been first made in China; and the introduction of these hangings into Europe probably suggested the manufacture here. They may be divided into three kinds—the flock, the metal, and the coloured; and each of these seems to have been invented at a different time, as an imitation of a distinct material. The flock, to imitate the figured tapestries and stuffs; the metal, in imitation of the gilt leather hangings; and the coloured, as a substitute for painted decoration. It is generally allowed that flock hangings were first manufactured in England, and invented by Jerome Lanyer, who obtained a patent in the reign of King Charles I., dated May, 1634, and carried on his art in London. In this patent it is stated "that, by his endeavours, he hath found

out an art and mystery of affixing wool, silk, and other materials, of divers colours, upon cloth, silk, cotton, leather, and other substances, with oil, size, and other cements, to make them useful for hangings and other occasions, which he calleth Londriniana; and that the said art is of his own invention."

M. Savary, in his *Dictionary of Commerce*, 1720, says that tonture-de-laine, or flock-hangings, were first made at Rouen, but in a coarse manner, being only used for grounds, on which, with flocks of different kinds, were formed designs of brocades. They essayed to imitate tapestry-hanging, but not successfully; and at last a manufactory was established at Paris, in the Faubourg St. Antoine, and there flowers and grotesques were introduced with success. The manufacture is thus described by him:—"The artist having prepared his design, drew on the cloth with a fat oil or varnish the subject intended to be represented; and then the flocker, from a tray containing the different tints of flocks, arranged in divisions, took the colours he required, and sprinkled them in a peculiar manner with his finger and thumb, so that the various shades and colours were properly blended, and an imitation of the wove tapestry produced." These descriptions, though detailing the manufacture of flock-hangings, yet do not allude to the use of paper as a ground, nor to blocks for printing. A French author, writing in 1723, says that paper-hangings, called tapestry in paper,were, till lately, only employed by the country people for their cottages, or by small tradesmen in their shops and rooms; but towards the end of the seventeenth century, the manufacture was raised to such a point of perfection and beauty, that besides the quantities that were exported abroad, and to the principal cities of the kingdom, there was scarcely a house in Paris not decorated with it. The manufacture at that time is thus described:—"The design, having been drawn in outline on paper, pasted together, of the size required, was then divided into parts of a suitable form, and given to the carver or wood-engraver, to cut the design on blocks of pear-tree, much in the same manner as at present. The outline thus cut was printed in ink, with a press, on separate sheets of paper: when dry, these were painted by hand in distemper colours, and afterwards joined together, so as to form the required design. Grotesques and panels, in which were intermingled flowers, fruits, animals, and small figures, were then executed by the above process." M. Reveillon, of Paris, is considered to have introduced many improvements in this manufacture, and was celebrated for the beauty of his productions in the latter end of the last century. The pillage of the workshops of this manufacturer in the Faubourg St. Antoine was one of the first incidents of the revolution in 1789.

In England this manufacture continued from the time of Lanyer, and obtained a high reputation. In 1712, a duty of $1\frac{3}{4}d.$ per square yard was imposed; and a Mr. Jackson, who established a factory at Battersea, for paper-hangings of classic design in chiaro-'scuro, writes, in a work published in 1754, in praise of his own productions, and condemns the fanciful paper-hangings at that time so much used, comparing them with the Chinese. In the year 1786, there was established at Chelsea a manufactory for paper-hangings of a very superior description, by George and Frederick Echardts. Works excelling even those of the present day were produced at this place; some of the blocks used are at present in possession of the writer of this report: they have great merit in the designs, and are some of them eight feet in length. These manufacturers carried the art to its highest point in England; they printed not only on paper, but also on silk and linen, and employed a number of artists, in addition to workmen and children. Mr. Sheringham, of London, also excelled at that time in decorative paper-hangings. During the present century, the French have not only restored this branch of manufacture to a high state of perfection, but have also introduced many important improvements, such as the embossed flocks and the shading of flocks, the perfect

imitation of chintz, improvements in the satin-grounds, and the introduction of work printed from engraved cylinders.

In England, the trade was protected by a duty of 1*s.* per square yard, up to the year 1846, when sir Robert Peel reduced it to 2*d.* This high duty acted almost as an exclusion to foreign makers, and there was therefore no competition with them, nor any inducement to improve. Since that time, however, the English manufacturers have made great progress in their art, both in style and workmanship, the trade has greatly increased, and the improved productions are sold at a greatly reduced price. They have, besides, applied themselves to the improved application of machinery, by which very beautiful papers are made at an extremely cheap rate.

The process of manufacturing ordinary paper-hangings, as now carried on, may be thus briefly described:—"The pattern being first carefully drawn, is then pricked, and the outlines of the various tints are pounced each on a separate wood block made of pear-tree, mounted on pine. These blocks are pressed on the sieves of colour, and then applied to the paper, each block following the other on the guide marks left by the previous impression. An idea may be formed of the enterprise and labour required to produce some of the decorative paper-hangings for the Great Exhibition, by stating that more than twelve thousand have been employed on a single one of them. In making flock-paper, the pattern is first printed in size, and then with a preparation of varnish or japan gold size. When this is partly dry, coloured flock, prepared from wools, is sifted on the varnish pattern, to which it adheres. Great improvements have been made of late years in this manipulation, more especially by French manufactures. Paper-hangings, where gilding is introduced, are prepared much in the same way as for flock: the leaf-metal is laid on the varnish pattern, or, if worked in bronze powder, it is brushed over with a hare's foot. The English manufacturers have attained great perfection in the preparation of metal-papers. The gilding having to encounter the damp and variable climate, is most severely tested; but by means of good material, careful manipulation, and a preparation washed over it, it remains unchanged for a considerable period."

Paper-hangings have been printed in England by means of hand-machines for many years, the papers being made in lengths of twelve yards, or single pieces, in one or two colours, and these colours falling separately on the ground. It was not until about ten years since, what is now understood as machine-printing was fully introduced; and this was done by Messrs. Potter, of Darwen, who, by means of steam-power, artificial drying, and an endless roll of paper, were enabled to produce patterns with good effect, by surface-roller-printing in several colours, on the principle of calico-printing: specimens showing fourteen colours were exhibited by this house. Messrs. Heywood, Higginbottom, and Co., of Manchester, have also effected great improvements in the manufacture, and exhibited patterns showing twenty colours made by fourteen rollers; and Messrs. J. Woollams and Co., of London, likewise exhibited excellent specimens made by machinery, in addition to those they make by block-printing. These machines are now each capable of printing from one thousand to one thousand five hundred pieces per day; and, although the work is not equal to block-printing in the solidity or permanence of the colours, yet the small price at which it is produced commands an extensive sale, superseding, to a great extent, the cheaper kinds made by hand. The above remarks apply only to paper-hangings of the cheaper qualities, for machine-printing has not yet been successfully applied to those with glazed or satin grounds. There is also another evil which it is most desirable to remedy—the colours are liable to run, without great care, in the hanging. There were very beautiful specimens of paper-hangings in the Great Exhibition; works which not only possessed considerable artistic excellence, but also showed great progress in the manufacture.

France has justly acquired a high renown for her works in this branch of industry. M. Delicourt, of Paris, exhibited a tapestry-like picture, entirely printed by blocks, representing a chase in a forest, surrounded by a rich, ornamental frame, with pilasters containing animals, birds, and attributes of the chase: twelve thousand blocks were required to execute this most creditable work. He likewise exhibited flower decorations, entirely executed in flocks, of which there were about seventy different shades; also very beautifully-finished plain flock-papers, called silk and wool. His two bas-reliefs of *The Descent from the Cross,* and *The Resurrection,* were good specimens of printing. M. Zuber, of Rixheim, exhibited one of his beautifully-executed landscape papers—one of a series of works for which this house is so celebrated; it represented the floral vegetation of the four quarters of the globe, and the richness and brilliancy of the colouring and the perfect workmanship were alike remarkable. M. Zuber also exhibited many other excellent specimens of the various kinds of paper-hangings, &c.: he is, besides, the author of many improvements in this trade. Messrs. Mader, of Paris, exhibited a picture representing a garden-scene—a very clever example of paper-printing, left, perhaps purposely, in a state where a few touches, by the hand of a clever artist would complete a beautiful effect. A well-executed figure in a panel, and other decorations of flowers and ornaments, besides some specimens of the more ordinary kinds of paper-hangings, attested the skilful workmanship of this house.

The English manufacturers of paper-hangings have produced many beautiful specimens also, both as decorative, damask, chintz, and flock-papers; those made by machinery have been previously alluded to. Messrs. Townsend and Parker, of London, exhibited paper-hangings of various kinds, of considerable beauty of design and execution; two of their decorations introduced fruit, flowers, and arabesque ornament of excellent execution. Messrs. Hinchliff and Co., of London, also produced good specimens of decorative and other paper-hangings; and the collections of Messrs. Williams and Co., and Messrs. Turner and Co., included many examples, showing that the art is well carried on in this country. Messrs. Spörtin and Zimmermann, of Vienna, exhibited paper-hanging decorations for ceilings, &c., in good taste. They have also adapted the process of block-printing in distemper colours, as a cheap form of illustrating works of science and art; the specimens they exhibited gave illustrations of machinery in isometrical perspective, very beautifully executed. M. Devis, of Brussels, exhibited a large collection of paper-hangings, more particularly in flock, of excellent execution. M. M. Rahn and Vetter, of Warsaw, forwarded a collection of paper-hangings, which possessed considerable merit, both as regards design, colouring, and execution.

CHAPTER XXIX.

DIGBY WYATT, ESQ., ON FORM IN THE DECORATIVE ARTS.

PRELIMINARY REMARKS—INFINITE VARIETY OF NATURE—FITNESS AND SIMPLICITY—CONTRAST—CONSIDERATIONS ON ARCHITECTURE AND SCULPTURE — OPTICAL DELUSIONS — IMITATION — ORNAMENT, ETC.

"It has pleased the beneficent designer of 'the world, and all that therein is,'" says our accomplished lecturer, "not only to surround man with the ever-varying and inexhaustible beauties of nature, and to endow him with the gift of sight to perceive her

graces; but he has been pleased also to confer upon him a mind to understand, and a hand to imitate them. These gifts are clearly talents committed to our charge, and to be accounted for by us. The same power—

'That gave us in this dark estate
To know the good from ill,'

conferred upon us also an unerring natural test to distinguish the beautiful from the mean or ugly. That test is the sensation of delight which invariably accompanies our recognition of beauty, moral or physical. Whenever the powers of the mind are concentrated upon any of the great external evidences of Omnipotence—upon 'the heavens above, or on the earth beneath, or on the waters which are under the earth'—it is impossible to refrain from pouring forth a tribute of silent but heartfelt admiration; and at such moments the Creator, as if to mark his approbation of the sacrifice, lulls for a while all memory of earthly pain or care, and pours peace and happiness into the soul. Thus it is that 'a thing of beauty is a joy for ever.' It is impossible to examine the smallest object upon which the skill of divinity has been exercised — a shell, a flower, or an insect—without feeling a longing to know somewhat of the mysterious laws which make that individual specimen of design so perfect, and without experiencing a desire to emulate the marvellous powers of creation. The first sensation of the exercise of such powers we feel to be godlike. Thus it is that man naturally attempts, in his feeble way, to emulate the loftier faculties of divinity; and thus ''tis to create, and in creating live a being more intense, that we endow with form our fancy.' From such exertions spring all that is ideal or poetical in every art.

"Whenever we attempt to penetrate the wondrous system that makes all nature one vast harmony it is impossible to refrain from feeling that—

'God moves in a mysterious way
His wonders to perform;'

and that it is as yet our portion only to see the full light of his majesty as 'through a glass darkly.' Enough, however, is still apparent to teach us that there are conditions of harmonious relation which pervade the most exquisite forms in divine creation; and it is only while catching a faint reflection from their glories that we can hope to succeed in the slightest degree, in throwing a veil of beauty over our comparatively insignificant productions. The first operation indispensable to any attempt to define the principles which should determine form in decorative art, must obviously be an investigation into those conditions of divine design in concord with which all human attempts at its imitation must be moulded, before a supreme sensation of delight can be produced. The occurrence of such a sensation we have already pointed out as the constant and unerring test of real beauty. We purpose, therefore, in the first place, to draw such general inferences together, concerning the great scheme of design manifested in the noblest works of nature, as we have been enabled to collect, either from the experiences of others, or our own study of the subject. The second operation must evidently be, to trace the application of these general inferences to the various material branches into which the different necessities of man, or his sympathies, have divided all those decorative arts which minister to his cravings for enjoyment on all occasions. We purpose, therefore, in the second place, to take a rapid survey of the principal members of that great family, and to point out some of the innumerable enactments of nature, specially affecting several of the most important individual 'departments of practical art.' Never in the whole history of the past has such a body of appropriate illustration of this branch of our subject been collected as was brought

together in the vast extent of the ever-memorable Palace of Industry; and it was impossible to examine carefully the rich store of material enclosed within its glassy walls, without gathering some few valuable hints. In entering on the first division of our, perhaps, too ambitious attempt, we are overcome with a sense of the infinite minuteness of our knowledge of the great conditions of creation. We recognise an almost universal beauty throughout the works of nature by the exercise of some faculty, as intuitive as memory, and not less inexplicable when we essay to predicate concerning its ineffably mysterious constitution. It has been well observed by some metaphysical writers, that in the development of the intellectual powers, the first effort is to realise, the second to enjoy, and the third to reason. In obedience to this theory, the first and constant effort of every child is to feel, to see, to use its senses, and to verify the fact of its existence by ascertaining its physical relation to all by which it is surrounded. Its second and occasional effort is to eat, to drink, to smell, to show pain and pleasure, likes and dislikes, and to observe and treasure up such experiences as can affect its subsequent enjoyment. The third effort is to exercise the gift of thought, and to form conclusions by other processes than those of direct sensation. Now we, as respects our knowledge of divine beauty, can be regarded only as very little children; and, if we would improve upon our condition of ignorance, instinct leads us onwards through parallel states of progress. Let but the first effort of one totally uneducated in art be to see and to feel nature, to look upon her works with an observant eye, and he will almost instantly find himself led on by unerring sensations of delight to the second stage of advancement. In that stage he will enjoy, discriminate, select, store in his memory, and at length endeavour either to reproduce, or cause to be reproduced, those natural objects, contact with which has caused him the greatest amount of pleasure. Thus the first phase of all art is rude direct imitation. No sooner does he arrive at the full development of his secondary condition, than he passes into the third. He begins to speculate upon the sensations he experiences, upon the phenomena of recurrence, and on the means whereby he may be enabled, by his own description or imitations of the original types, to convey to others the pleasures he himself derived from a contemplation of them—thus the ignorant may grow into the connoisseur, and thus the child into the artist.

"A knowledge of the sequence of these natural phases of transition points out the course by which alone special education in decorative art can be brought to a successful issue. Surround the pupil with every attainable example of general beauty of form, if he is to be a general artist or draughtsman; make him acquainted with all the antecedent productions in his speciality, if he is to be a special designer. Show him only as much as possible of what is good, whether general or special; then his sense of enjoyment will teach him selection, and he will store his memory with the best. Practise his hand as you educate his senses, and the feeling of power will soon come upon him. Reason will assert its empire, and inquiry will be stimulated. Once roused, effort will succeed effort, and thus in time the pupil will grow into the master. As it is impossible to arrive at correct theories in science, except by the analysis of accumulated observations—firstly, of things; secondly, of properties; and thirdly, of relations—so it is impossible to assume any general conclusions concerning divine design without passing through the three stages of realization, enjoyment, and reflection. When we take into consideration, on the one hand, the shortness of life and the limitation of the powers of man, and on the other, the extent and illimitable divisibility of matter and its incessant changes in form and application, we cannot but feel conscious in how slight a degree the best disposed and most talented student of nature can have become acquainted with her innumerable phenomena, a thorough knowledge and enjoyment of which we have shown to be indispensable to any just general conclusions. It is only by the transmission from generation to genera-

tion of accumulating experiences and deductions, that the very few points we are about to indicate have been assumed as universal recurrences in the external forms in which nature pours forth her bounteous gifts to man. The first quality with which the observer must be struck is the infinite variety of form which pervades creation. On attempting to reason concerning it, he perceives its dependence upon the functions each object, and the component parts of each object, are ordained to fulfil; hence he will at once recognise the fact, that form is in every case, if not dependent on, at least coincident with, structural fitness. When the most complex flower is submitted to the test of a scientific botanical examination, no particles are found to be adventitious—all are concerned in fulfilling the appointed functions of vegetable physiology. As those functions vary with the growth of the plant, so in every case does its form—changing from tender bud to blooming flower, and from blooming flower to reproductive seed-pod, as each successive change of purpose progresses. Infinite variety and unerring fitness thus appear to govern all form in nature. While the former of these properties demonstrates her infinite power of complexity, the latter restrains the former, and binds all in beautiful simplicity. In every case ornament appears the offspring of necessity alone; and, wherever structural necessity permits, the simplest lines, in every case consistent with the variety of uses of the object, are adopted. Thus, the principal forest-trees, which spring erect and hardy from the ground, in their normal state, uninfluenced by special conditions of light or heat, shoot straight aloft, with boughs equally balanced on all sides, growing so symmetrically, that a regular cone or oviform would, in most cases, precisely define their outline; and thus the climbing plants, from their first appearance, creep along the ground in weak and wayward lines, until they reach something stronger and more erect than themselves; to this they cling, and from it hang either vertically or in the most graceful festoons; to each its character of form as of purpose—to each the simplest line consistent with its appointed function and propriety of expression. From nature's delight in simplicity, man probably derived his earliest perception of geometrical figures. The term horizontal at once betrays the source from which our idea of such a line may have been derived. Upon the horizon, as a base, endless perpendiculars are erected in every plant that pierces the soil at right angles to its tangent. A plain in nature furnishes the idea of a plane in geometry. Every variety of triangle is indicated by the outline of the snow-clad peaks of the loftiest mountains; every kind of cone by their substance. The thin clouds that sweep along the sky at sunset, hanging over the distant blue line of the ocean, form exquisite parallels; and where cut by the lines of trees and plants suggest every variety of square and oblong, rhombus and parallelogram. Where compactness is indispensable, the honey-yielding hexagons abound; and in her endless variety of crystals, nature has furnished us with models of the most exquisite solids. In the rainbow we have her noblest arch; in the parabola at once one of her most graceful curves and most elegant formulæ of projection.

"While a consideration of the quality of fitness binds us to simplicity, that of variety, as if in counterbalance, conducts us to a just recognition of the value of contrast throughout all the works of creation. Simplicity becomes appreciable only when opposed to complexity; while complexity itself will, on analysis, be found to consist only of the combination of parts, individually of extreme simplicity. The researches of Mr. Penrose have lately developed many of the most interesting phenomena respecting the 'simultaneous contrast of form;' and have not only demonstrated the fact of the scientific acquaintance of the Greeks with their peculiarities, but have shown how essential an attempt to apply such knowledge has been to the production of those exquisite monuments which from the first moment of their creation to the present time, have maintained a position of unquestionable supremacy over every other work which human art has yet

produced. The general result of Mr. Penrose's investigation tends to the assumption, that no two lines can come in contrast with one another, either in nature or in art, without the direction of the one acting, either attractively or repulsively, upon the other, and tending to diminish or exaggerate the mutual divergence of both lines, *i. e.* to increase or lessen to the eye the angle at which they meet. Thus, if to a perfectly horizontal line another be drawn, meeting it at an angle of six degrees (about half the angle at which the inclined sides of the best Greek pediments leave the surface of the cornice), it will be difficult to convince the eye, as it traces the direction of each line, that the angle has not been materially increased by an apparent deflection of the base line, and an apparent very slight drawing down of that with which it actually forms an angle of six degrees only. In order to remedy similar apparent distortions in their monuments, the Greeks have given Entasis, or swelling to their columns, inclination of the axes of their pillars towards a central line, a tendency outwards to their antæ, and exquisite convex curves to the horizontal lines of their cornices and stylobates, which would otherwise have appeared bent and crooked. Nature, in working out her harmonies of contrast, abounds with similar optical corrections. The infinitely gentle convexity of her water sky-line is precisely corrected into perfect apparent horizontality by contrast with any line at right angles to a tangent to its curve. It is by attention to the optical effects produced by the impact of lines upon one another in nature, that the artist can alone store his mind with the most graceful varieties of delicate contrast. Thus it is alone that he can appreciate the extreme beauty of her constant, minute, and generally inappreciable divergence from the precise mathematical figures, in approximation to which simplicity demands, as we have already shown, that her leading forms should be modelled.

"We have now arrived at a recognition of the four principal elements which invariably concur in producing those emotions of delight, which may be regarded as infallible tests of our contact with real beauty in the productions of nature—variety, fitness, simplicity, and contrast. Before leaving our consideration of these elements, we cannot refrain from drawing attention to that which is the crowning illustration of the effects of their co-operation — the human body; that theme, upon the re-production of the external features of which the highest powers and the profoundest study have been lavished by the greatest artists of all time. In its structure, the anatomist, aided by microscopic examination, discovers a *variety*, to which that of the Great Exhibition was monotony itself; a *fitness*, to which the most exquisite machines therein contained displayed no parallel; a *simplicity* of external form, which, without the slightest display of all that marvellous internal mechanism, confines the whole in a space precisely adapted for the free working and protection of every part, and yet covers all with a soft and undulating surface, the curves of which are gentleness and *simplicity* itself. *Contrast* between curve and curve, between one line of limb and another, produces in motion incessant *variety* of expression, still in obedience to the bounding conditions of simplicity. The swelling muscles, increasing as the angles of approach are diminished by their action, counteract otherwise apparently ungraceful concavities, and in that loveliest of created things, the perfect female form, every quality of beauty is freely and exquisitely balanced and united.

"To recapitulate the sequence of these four great impressions, we may state, that when the attention of the student of nature is first concentrated earnestly upon her works, his senses are bewildered by the variety of her charms. His first discovery will probably be that of the perfect individual fitness of some one object upon which he may fix for analysis; he will subsequently recognise fitness as universal. In perfect fitness he will marvel at perfect simplicity; and as he becomes acquainted with normal forms, isolated or at rest, he will learn to gather general impressions when he witnesses their combination, or varying forms in contrasted action. As from this point his experiences increase, he will

begin to appreciate marvellous affinities; he will find certain conditions universally forming the basis of propriety in all imitations of nature. Thus he will recognise that she has a style of form and detail peculiar and appropriate to every material in which she works, and that this style of form and detail is, in every case, modified by the exact method in which her operations of manufacture are conducted. Of this no more perfect illustration can be given than the lines of fibrous reticulation which constitute the substance, and at the same time form the ornament, of every leaf that blows. In the aggregate of every class he will trace general character, while the slightest variety of structure will infallibly be testified by some change in external outline. Gradually form will become with him an index to all leading attributes; a clue by which he will at once recognise the relation of bodies, or their properties, to one another. Thus, from form alone he will soon discern at a glance of what materials, and how, any particular object he may examine has been executed. This index or clue, be it remarked, never misleads; the 'lamp of truth' never in nature burns dimly, nor with fallacious fires; never refuses to illuminate those who incline to learn in a truthful and reverential spirit. One material in her productions never looks like another. Rocks have their rugged outlines; minerals their appropriate crystal; metals their colours and glittering aspects; timber its bark and cellular section; flowers their delicacy and evident fragility; even transparent bodies their varying angles of refraction; water its glassy surface when at rest, and unmistakeable curves when agitated. Never does a flower look like a piece of metal; never a piece of timber like a rock.

"As the student's acquaintance with these consistencies in nature increases, his power of generalizing will become developed. He will learn to separate constants from accidents, and to trace the distinctive lines which convey the idea of each general family of materials, or modes of formation. He will begin to select, and to treasure up in his memory, those symbols of expression with which nature indicates the leading characteristics of every variety of objects she produces. On the amount of the artist's acquaintance with such conventionalities, or, in other words, with the written language of nature, will entirely depend his possible success in producing by his labours sensations of delight at all equivalent to those excited by the aspect of her noblest works. Direct imitation will do next to nothing; fanciful and ignorant invention still less: it is alone by his power of wielding her weapons of expression, and making in all cases the form and the object strictly concordant, as she does, that the artist may aspire to emulate the power of giving delight, which, above all others, appears to be her paramount prerogative. Time will not permit our dwelling further upon the general inferences deducible from a study of the wonderful beauties of nature. Enough may, however, have been enunciated concerning the most palpable principles, to warrant our assertion, that there exist conditions of harmonious relation which pervade the most exquisite forms in divine creation. It will be our pleasing task now to show, how essential it is that we should catch a faint reflection from their glories, before we can hope to succeed in the slightest degree in throwing a veil of beauty over our comparatively insignificant productions.

"In entering on the second division of our subject, we shall endeavour to trace the application of principles analogous to those on which we have lately dwelt—in the first place, generally; and in the second, to the respective leading and special departments of practical art. In the first place, then, it may be observed generally, that the endless diversity of men's tastes, and the ever-changing conditions of their education and association of ideas, demand for their productions a *variety* almost as incessant as that which pervades creation. Whenever that craving after variety has been gratified, irrespective of *fitness*, novelty has degenerated into frivolity, design into conceits, and style into mannerism and vulgarity. Without a due attention to *simplicity*, fitness has

never been adequately carried out; attention has been diverted from a proper estimate of every work of art or object of manufacture; and false impressions concerning its true and legitimate functions have been generated.

"Contrast teaches us to give a due relief to all to which we would desire to call attention. A sudden break in a long straight line, a slender necking in a continuous sweep, a sudden concavity in a generally convex outline, a bold projection starting forward from an even plane, right lines opposed to curves, segments to sections of the cone, smooth to rough surfaces, conventional forms to direct imitations of nature, all carry out the desired object, and are every one subject to the phenomena of simultaneous contrast of form. To obviate such optical delusions, allowances must be made in every case by the artist; many such corrections are constantly perceived and effected by the eye; but few, alas! by rule. In reference to such corrections, it is justly remarked by so ancient a writer as Vitruvius, that 'the deception to which the sight is liable should be counteracted by means suggested by the faculty of reasoning. Since the eye alone,' he continues, 'is the judge of beauty, and where a false impression is made upon it, through the natural defects of vision, we must correct the apparent want of harmony in the whole by instituting peculiar proportions in particular parts.'

"When we turn to a consideration of the united action upon human design of the general principles of consistency, exhibited in the works of nature, we find that of all qualities which can be expressed by the objects upon which our executive ability may be occupied, the noblest, and most universally to be aimed at, is plain and manly truth. Let it ever be borne in mind that design is but a variety of speech or writing. By means of design we inscribe, or ought to inscribe, upon every object of which we determine the form, all essential particulars concerning its material, its method of construction, and its uses; by varying ornaments, and by peculiar styles of conventional treatment, we know that we shall excite certain trains of thought and certain associations of idea. The highest property of design is, that it speaks the universal language of nature, which all can read. If, therefore, men be found to systematically deceive; by too direct an imitation of nature, pretending to be nature; by using one material in the peculiar style of conventionality universally recognised as incident to another; by borrowing ornaments expressive of lofty associations, and applying them to mean objects; by hiding the structural purpose of the article, and sanctioning, by a borrowed form, the presumption that it may have been made for a totally different object, or in a perfectly different way—such men cannot clear themselves from the charge of degrading art by systematic misrepresentation, as they would lower human nature by writing or speaking a falsehood. Unfortunately, temptations to such perversions of truth surround the growing designer. The debilitating effects of nearly a century's incessant copying without discrimination, appropriating without compunction, and falsifying without blushing, still bind our powers in a vicious circle, from which we have hardly yet strength to burst the spell. Some extraordinary stimulant could alone awaken all our energies, and that stimulant came—it may not, perhaps, be impious to esteem providentially—in the form of the great and glorious Exhibition. It was but natural that we should be startled when we found that in consistency of design in industrial art, those we had been too apt to regard as almost savages were infinitely our superiors. Men's minds are now earnestly directed to the subject of restoring to symmetry all that had fallen into disorder. The conventionalities of form peculiar to every class of object, to every kind of material, to every process of manufacture, are now beginning to be ardently studied; and, instead of that vague system of instruction by which pupils were taught, that anything that was pretty in one shape was equally pretty in another, a more correct recognition of the claims of the various branches of special design, and the necessity of a far closer identifi-

cation of the artist with the manufacturer, in point of technical knowledge, have been gradually stealing upwards in public estimation. Let us hope that success will crown exertion, and that in time the system of design universally adopted in this country will offer a happy coincidence with those lofty principles by means of which the seals of truth and beauty are stamped on every emanation from the creative skill of divinity.

"In approaching the more directly, though not essentially, practical portion of our subject—that of the application of nature's principles to some of the special departments of practical art, represented in the Exhibition, we shall premise by a few considerations on architecture and sculpture, and the plastic arts. It would be difficult to imagine a juster and more comprehensive view of the extent of direct imitation admissible in each department of the fine arts than that which was presented in the *Appendix to the Third Report of the Commissioners,* by Sir Charles Lock Eastlake. In a note to one of those important essays the writer observes, that 'the *general* style of the formative arts is the result of a principle of selection, as opposed to indiscriminate imitation. It consists, therefore, in qualities which may be said to distinguish those arts from nature. The specific style of any one of the arts consists in the effective use of those particular means of imitation which distinguish it from other arts. Style is complete when the spectator is not reminded of any want which another art, or which nature, could supply.' Now, the specific style of architecture is especially worthy of study; since, not only do similar conditions pervade all branches of design into which structural forms enter as principal elements, but of all the arts it is obviously the least imitative, and the most abstract. The effects of delight which can be produced by it, are dependent, not upon a reproduction of any objects existing in creation, but upon a just display by the architect of his knowledge of those subtle general conditions, a few of which we have recognised as pervading every perfect work of nature. The beauty of civil architecture, we are told by the best writers upon the subject, depends upon—1st. Convenience; 2nd. Symmetry, or proportion; 3rd. Eurythmia, or such a balance and disposition of parts as evidences design and order; and, 4thly, On ornament. In too many modern buildings, alas! we find that either convenience has been attended to and all other qualities left to chance, or, what is still worse, ornament alone aimed at, and all other considerations disregarded. Let us, for the sake of example, trace the operation of the principles to which we have alluded, all of which will be found to have their origin in the provisions of nature. The wise architect will begin by considering the purpose of his building; and will so contrive its plan and leading form, as to fulfil all the utilitarian objects for which it was proposed to be constructed; in other words, he will be governed by a sense of *convenience* or *fitness.*

"He will then consider how all the requisites can be most agreeably provided, and harmonious proportion combined with an expression of purpose. He will find, on recurring to nature, that every substance suitable to be employed in construction, exhibits endless *variety* in strength, weight, and texture. He will study these various qualities, and by experiment ascertain that each material possesses a certain scale of proportions, and a certain series of solids, by the employment of which, in fixed positions, its functions may be at once most economically and most fitly employed. Acting on such data, he will distribute his lines of sub-structure, his columns of support—his load supported, his walls to resist the driving of the elements; and he will assign to each its special proportion and form—never confounding those of one substance with another—never using iron as he would stone, or wood as glass should be. Thus aided by his sense of the functions of each portion of the structure, the material of which it may be constructed, and its condition of relative importance, the architect adjusts the appropriate dimension of every part. His work is as yet, however, only half done; his materials require bringing into graceful

and regulated distribution. At this point, Eurythmia, the original of 'the fairy order,' steps in, bringing geometry in her train. Doors, windows, columns, cornices, string-courses, roofs, and chimneys, are instantly disposed so as to contrast with, and balance one another, showing, by the symmetry of their arrangements, the artist's appreciation of that method and evidence of design which indicate the restraining power of mind over matter throughout all nature—wild as her graces may occasionally appear. The crowning difficulty yet remains behind in the adjustment of appropriate ornament. In all other departments of his art, the architect employs only pure abstractions, harmonizing with his general deductions of leading principles of beauty: in his application of ornament, however, his resources are somewhat more expanded. All decoration, the forms of which are borrowed from nature, to be pleasing, must undergo a process of conventionalizing; direct imitation, such as that which would be produced by casting from a gelatine mould, would infallibly disappoint, since the perfect reproduction of the form would lead to demands for reality—in colour, in texture, and in other qualities which it might be utterly beyond the power of any other material or processes to render, than those which nature has herself employed in the original. The duty of the architect is, therefore, to study, first of all, to employ such forms as harmonize and contrast with his leading lines of structure; and then, in those few instances where, for the sake of adding more immediately human interest to his work, or for explaining its purpose more directly, he may desire to suggest the idea of some object existent in nature—then, and in such a case, it is his duty to symbolize rather than to express, and to strive to convey an idea of particulars and qualities only, instead of to make a necessarily imperfect reproduction, which conveys no idea at all. As a general rule, the less closely the artist attempts to embody nature the more safe he will be, but as there are, we conceive, some few cases which justify a nearer approximation than is generally admissible, we shall proceed to enumerate the most important of them, premising that, paramount over every other consideration, must reign an exact regard to the conventionalities incident to the material employed, and the absolute necessity of arranging the forms of the ornament, so as to contrast rightly with the adjacent geometrical lines of structure.

"1st. That imitation may approximate to nature only in an inverse ratio to the resemblance of the material in which the work is to be executed to the object to be copied. Thus, the smoothness of flesh may be imitated with delicacy in white marble, and the idea of rock-work only conveyed in the same material by a completely formal and geometrical method of representation. 2nd. That as imitation, in all cases, interests and attracts attention, it becomes necessary to restrict its use sparingly to particular situations; thus, we may, on the one hand, with propriety employ decorations suggestive of natural types, in those few important points on which we wish the eye to dwell, such as the centre of a façade, the principal doorway, or window, the starting of a staircase, or the end of a boudoir; but if, on the other hand, we employed in such leading situations mere conventional patterns, and in less important parts, ornaments in convention approaching imitation, then we should find attention concentrated on those meaner portions of the structure, and the really principal features of the design passed over and neglected. A striking illustration of the consequences of this want of discrimination was shown by the sculptor Lequesne, in his various groups in the great Exhibition; the care he bestowed in working up his accessories, his weeds, foliage, rocks, earth, and everything else, almost entirely neutralized the interest which should have been excited by the finished treatment of the flesh of the unhappy mother and her miserable infant. The admiration which might otherwise have been given to his two groups of dogs and boys, were completely absorbed by admiration at the patience with which 'each particular hair' was made to curl. To all the above-described faults the works of M. Etex offered a truly remarkable

contrast, the labour in them being applied at exactly the right points. 3rdly. That, where ornament is contrasted by evident connexion with geometrical lines of structure, conventional imitation may be introduced. Thus, in many of the marble chimney-pieces in the Exhibition, and in much of the furniture, the structural forms of which made regular panels, or conventional frame-work, the introduction of nicely-carved flowers or fruit, of the size of nature, and in low relief, produced an agreeable effect. Where, in others (and more particularly in some of the Austrian), the foliage, scrolls, cupids, and all sorts of things, completely ate up the whole surface, and made up the whole structure, the effect was eminently objectionable. 4thly. That where the copy differs absolutely in bulk from the original, minutiæ of surface detail may be introduced. Thus, when we reduce a subject, such as a bunch of grapes, from the round or full relief to the lowest relievo, much of the conventionality which would otherwise be essential may be dispensed with. 5thly. That considerable differences of scale in things of unvarying dimension, justify an approach to natural form. Thus, when we materially diminish in our reproduction any object, the smallest size of which is generally known never to equal that to which it is lowered in our copy, we may safely attempt as close a conventional transcript as the material in which we work admits of. On this account delicate flowers, such as those which decorate small Dresden china vases, and which are executed with such skill in biscuit by Mr. Alderman Copeland, Mr. Minton, Mr. Grainger of Worcester, and others, form not unappropriate ornaments when confined to a scale considerably smaller than nature. In cases, however, such as that of the Dresden white camelia tree of the Exhibition, where an attempt is made to copy nature on her own scale, the effort altogether fails, and the labour, so far from giving pleasure, is utterly useless and becomes a trick not less inimical to good taste than the veiled figures. 6thly. That where, in ornament, the leading forms are geometrically disposed, as in regularly recurring scrolls or other curves, which could never take so formal a position in nature, a rendering of her spirit, though not of her substance, may be permitted in the leaves and accessories. Thus, in much of the elaborate wood-carving produced by Mr. Rogers and others, the artificial disposition alone of the beautifully executed objects redeemed many of the groups from the charge of too close a reproduction of nature.

"Before proceeding to the subject of sculpture, we would fain offer one or two remarks concerning what is called style in art, for fear lest our recommendations to systematic study of elementary principles should be misapprehended. In what are generally understood as styles in the history of art, such as the Grecian, the Roman, the Gothic, the Renaissance, &c., may be recognised deeply-interesting accumulations of experience concerning the nature of men's intuitive affections for certain concatenations of form. Styles are usually complete in themselves; and though not of uniform excellence, are still generally concordant among all the various members that compose them. Whatever may have been the dominant form in each, or whatever the favourite set of ratios, proportion usually pervades each whole monument, as it may be generally traced in a few detached mouldings. Styles, therefore, may be regarded as storehouses of experiments tried, and results ascertained, concerning various methods of conventionalizing, from whence the designer of the present day may learn the general expression to be obtained, by modifying his imitations of nature on the basis of recorded experience, instead of his own wayward impulses alone. Canova, Gibson, and many of the greatest masters in art, held and hold the creed, that nature, as developed in the human form, can only be rightly appreciated by constant recurrence to, and comparison with, the conventionalities of the ancient sculpture of Greece. Mr. Penrose has shown us what beautiful illustrations of optical corrections in line may be gathered from the study of her architectural remains. Mr. Dyce, who has made himself deeply acquainted with ancient styles, thus expresses

himself on the subject:—'In the first place,' he remarks, 'the beauties of form or of colour, abstracted from nature by the ornamentist, from the very circumstance that they are abstractions, assume in relation to the whole progress of the art the character of principles or facts, that tend, by accumulation, to bring it to perfection. The accumulated labours of each successive race of ornamentists are so many discoveries made—so many facts to be learned, treasured up, applied to a new use, submitted to the process of artistic generalization, or added to. A language and a literature of ornamental design are constituted; the former of which must be mastered before the latter can be understood; and the latter known before we are in a condition to add to its treasures. The first step, therefore, in the education of ornamentists, must be their initiation into the current and conventional language of their art, and by this means into its existing literature.' By this last passage, we may fairly assume that Mr. Dyce would recommend, first the study of the conventionalities of the student's speciality, and then as much as life is long enough to learn. The great previous error in art-education has been to grasp at so much vaguely, and attain so little practically.

"The modifications which nature receives at the hands of the intelligent sculptor are so various, and frequently so subtle, that it would require a volume to enumerate them, and an Eastlake to write it. We can glance but at a very few. The first condition of the highest class of sculpture is, that it should be allied with the noblest architecture, to which it should serve as an inscription, explaining to those capable of reading its ideal expression those purposes of the structure which it is not in the power of architecture alone to convey. In all such cases *fitness* prescribes the subject—*simplicity*, its sublimest treatment—*contrast*, the general condition of the lines of its composition. In order to give to his works that commanding language which speaks to the heart (the phonetic quality in Mr. Fergusson's admirable theory of beauty in art), the sculptor requires to select from his observation of the expression of individual forms, those precise lines, which, he learns from study and experience, invariably convey the particular sensations it is his office to communicate to the mind of the beholder. It was by some such process that an approach was made by the Greek sculptors of old to attain an embodiment of their conceptions of divinity, and the *beau idéal* in loveliness of form. The peculiar refinements of form and texture which fall within the especial province of the sculptor to carry to their highest pitch of perfection, he constantly heightens by availing himself of the effect on the senses of the simultaneous contrast of form. Thus he exaggerates the roughness of the hair and the coarse texture of every object coming in contact with his flesh, in order to give to it the exquisite smoothness of nature; he introduces straight lines, equally balanced folds, and angular breaks into his draperies, in order to bring out the tender sweeping curves of the outlines of the limbs he so gracefully disposes. His is, of a truth, the happy art which begins by collecting all that is most sweet and fresh; and then by one additional touch, one further artful contrast, he 'throws a perfume on the violet.' In sculpture, as in every other of the decorative arts, changing circumstances bring ever-changing conventionalities; and, as supreme arbiters over the propriety of one and all, still preside our original great principles—*variety, fitness, simplicity, and contrast.*"

CHAPTER XXX.

ON COLOUR IN THE DECORATIVE ARTS.

COLOUR EMPLOYED IN ARCHITECTURE BY THE ANCIENTS — COLOUR DEVELOPES FORM — COLOURING OF THE GREAT EXHIBITION—IMITATIONS—FLOWERS, ETC.—MURAL DECORATIONS —REMARKS ON ARCHITECTURAL EDUCATION—PROGNOSTIC FOR THE FUTURE.

Having made our readers acquainted with Mr. Digby Wyatt's admirable definition of the principles which should determine Form,—we will now turn to the no less successful attempt of Mr. Owen Jones to define those which should regulate Colour, in the decorative arts:—"It can scarcely too often be repeated," says our author, in the commencement of his learned discourse, "that among the many advantages which must result to England from the gathering of the products of the world's industry in the great exhibition, no one is so prominent as that we have thereby learned wherein we were deficient; and although we may gather from the lectures which have already been delivered before this society a high idea of the power, wealth, and industry of this great country; of the untiring enterprise which gathers from a distance the products of every clime; of the persevering industry which makes them available to the wants of man; and we may further witness the constant struggle to utilize every gift of nature, till truly it may be said, nothing has been made in vain; yet, side by side with success, we have seen much of labour wasted, much knowledge imperfect, much energy misapplied: and when we leave the field of science and industry and turn to art, we have to learn from the Great Exhibition a fruitful lesson; from leading the van in the march of progress, we must fall into the rear, and suffer to pass before us nations whose efforts we have hitherto but imperfectly appreciated.

"In the employment of colour we were not only behind some of our European neighbours, but, in common with these, were far outstripped by the nations of the east. Let us endeavour to trace the cause of this, and, if possible, discover the principles which in their case have led to so signal a success. As architecture is the great parent of all ornamentation, it is from the study of architectural monuments that we shall best obtain a knowledge of the principles which govern the employment of ornament and of colour generally. In all ages but our own, the same ornaments, the same system of colouring which prevailed upon their buildings, pervaded all they did, even to their humblest utensils: the ornaments on a mummy-case are analogous with those of the Egyptian temple; the painted vases of the Greeks are but the reflex of the paintings of their temples; the beautiful cushions and slippers of Morocco of the present day are adorned with similar ornaments, having the same colours as are to be found on the walls of the Alhambra. It is far different with ourselves. We have no principles, no unity; the architect, the upholsterer, the paper-stainer, the weaver, the calico-printer, and the potter, run each their independent course; each struggles fruitlessly, each produces in art novelty without beauty, or beauty without intelligence. The architect, the natural head and chief of all who minister to the comforts and adornments of our homes, has abdicated his high office; he has been content to form the skeleton which it should also have been his task to clothe, and has relinquished to inferior and unguided hands, the delicate modelling of the tissues and the varied colouring of the surface: who can wonder at the discordance and incongruity of the result? Until very recently, the employment of colour on buildings has had but few advocates in this country; we are still imbued with the prejudices left us by our immediate ancestors and developed in our early education. Although we now know

that many of the monuments of antiquity were entirely covered with colour and ornament, while of others we have evidence that they were partially painted, and are further bound to conclude that they were entirely so, yet this is still disputed, and not long since the Royal Institute of British Architects were unable to vanquish this prejudice amongst their own body; and it remains to this day with them, alas! a disputed question, to what extent the monuments of Greece were coloured. There are artists more willing to believe that the Greeks were imperfectly organised for the appreciation of colour, and consequently misapplied it, than that the defect can lie with ourselves, and our imperfect knowledge of what they did and why they did it. I will ask you to believe that the stupendous monuments of the Egyptians, the Greeks, the Arabs, and other eastern civilisations, with the nearer to us Gothic buildings of our own forefathers, were not in vain covered with a most elaborate system of ornamentation requiring colour for its development, but rather in obedience to a patient observation of nature's works, where we find everywhere colour assisting in the development of form and adding many charms which but for this were wanting. In asking you to watch the means by which these additional charms were given, I do not wish you to understand that what the ancients did we should now repeat, but should follow them only so far as we find they acted on principles by them universally recognised and running through all time, and which we may now presume to be discovered truths, and therefore not wisely to be rejected."

Our lecturer proceeds to lay down a series of propositions, which he endeavours, successfully we think, to establish as axioms, and from them justifies the practice of the ancients in colouring their architecture. "Colour," he observes, "is used to assist in the development of form, and also to assist light and shade, helping the undulations of form by the proper distribution of the several colours. And these objects are best attained by the use of the primary colours on small surfaces, and in small quantities, balanced and supported by the secondary and tertiary colours, on the larger masses. There are many who will object that the primary colours are the delight only of the savage and the uncultivated, but I answer that the primary colours are never vulgar or discordant when properly applied; the defect will lie, not with the colours, but with the want of skill of the hand that applies them. They must be used as in nature, with a sparing hand, on small surfaces, and in small quantities; the secondaries and tertiaries in larger masses, and on larger surfaces, atoning for their lesser brilliancy by their greater volume. We find in the works of the Egyptians, Greeks, Arabs, and Moors, during the best periods of their art, this beautiful law invariably followed: but, on the contrary, when the art of each civilisation declined, the primaries are no longer the ruling harmonies; the secondaries and tertiaries, from being subordinate became dominant, and muddiness and indistinctness resulted. In Egypt, during the reigns of her native kings, the primaries mainly prevailed; whilst under her Greek rulers art languished, and being practised rather from imperfect tradition than from poetic inspiration, the secondaries usurped the place of the primaries, and the beautiful harmonies which had before been produced by their combination were lost. When the truly enchanted palaces of the Moors fell into the hands of the Catholic kings, who despised a civilisation they were unable to appreciate, the true principles which the Moors had learned in their worship and observation of nature's works were despised and rejected, because, as now, not understood. Their blues and reds were repainted with green and purple, without law or reason." Our author next proceeds to show that the primary colours should be used on the upper portions of objects, the secondary and tertiary on the lower. And he illustrates the practical working out of his propositions by referring to the colouring he adopted for the interior of the Great Exhibition, which, after running the gauntlet of much adverse criticism, was ultimately favourably received by the public.

We extract some valuable remarks on "imitations;" such as the graining of woods, &c.:—"The principle which should regulate the employment of imitations has never yet been defined: it appears to me, that *imitations are allowable whenever the employment of the thing imitated would not have been inconsistent.* For instance, there can be no objection to grain a deal door in imitation of oak, because the mind would be perfectly satisfied if the door were oak; but it would be an absurdity and abuse of means to paint it in imitation of marble. Again, the practice of covering the walls of halls and staircases with paper in imitation of costly marbles, is very objectionable; because the employment of marble to such an extent would be inconsistent with the character of most houses, and, consequently, the sham is much too glaring: on the contrary, were the pilasters and columns of a hall only painted, the objection would cease, seeing that the mind would be satisfied with the reality. A violent instance of the abuse of graining existed formerly in the Elgin Room at the British Museum, where beams on the ceiling, thirty feet long, were splashed in imitation of granite. Here was a manifold absurdity, as no granite beam could have supported itself in any such situation. The door-jambs of an opening, on the contrary, might be imitation granite without inconsistency, as in such a situation granite would be useful as indicating strength. In the outcry against the mode of colouring I proposed for the interior of the Great Exhibition, my opponents fell into an error of this kind; led away by the desire of having the metallic character of the building expressed, the majority were in favour of colouring the whole of that vast edifice in imitation of bronze, entirely forgetting that the employment of so costly a material for such a structure would have been impossible, and would have had the further disadvantage of being too weak to stand: therefore its imitation would have been an absurdity, quite independent of the artistic objections to such a mode of colouring, which were many. The mode I adopted treated the whole as a painted surface, and the eye was left at liberty, and was quite able to distinguish the material painted, by its form and scantling; no one, as was so often prophesied, mistook the columns for wooden posts, because no wooden posts could have existed in such a form under such circumstances."

With respect to flowers or other natural objects our author is of opinion that they should not be used as ornament, but conventional representations founded upon them, sufficiently suggestive to convey the intended image to the mind without destroying the unity of the object they are employed to decorate.

"We find this law universally obeyed in all the best periods of art, and equally violated when art declines; those who conventionalised the most were the Mahommedan races; who, forbidden by their creed to represent living forms, carried the conventionality of ornament to the highest perfection. The Egyptians, with whom every ornament was a symbol, yet took care so to use them as never to violate a sense of propriety. The Greeks equally conventionalised in their ornament; and, although the law will not appear to hold good in their application of sculpture to architecture, yet we see here they adopted a conventional treatment both of pose and relief, and very different to that of their isolated works. In the later Gothic buildings the floral ornaments have a much nearer approach to nature, and are less conventional in arrangement than those in the earlier buildings. In the early illuminated MSS. the ornaments were conventional, and their illuminations were in flat tints with little shade and no shadow; whilst in those of a later period highly-finished representations of natural flowers were used as ornament, casting their shadows upon the page; the illuminations, also, were highly-finished pictures, evidently unfit for the pages of a book where the affected relief was in danger of crushing. The Chinese, whose works, however wanting refinement and art-knowledge, yet steer clear of this; and all their figures, buildings, flowers, are so conventional in treatment, that they never shock the eye or destroy the unity of the object which they decorate. If our proposition, then,

be sound in theory, and be fortified by the practice of past ages, it applies with great force to the mural decorator, the paper-stainer, the calico-printer, the weaver, and the potter; and, in fact, to all engaged in the decorative arts. It is evident, that one of the first principles to be attended to in the adornment of the walls of an apartment is, that nothing should disturb their flatness; yet it is very difficult to find a paper that does not in some way violate this rule: they are either large masses of conventional foliage, generally a variation of the eternal acanthus-leaf surrounding patches of unbroken colour, or representations of fruits or flowers twisted into the most unwarrantable of positions.

"We say that all direct representations of natural objects in paper-hangings should be avoided: first, because it places these objects in unseemly positions; secondly, because it is customary in almost every apartment to suspend on the walls pictures, engravings, or other ornamental works, and therefore the paper should serve as a background, and nothing on it should be obtrusive or advancing to the eye. Diaper-patterns in self-tints are safest for this purpose, but when varieties of colours are used, the oriental rule of so interweaving the form and colour as that they may present a neutralised bloom when viewed at a distance should never be departed from. The prevailing colours of the walls of rooms hung with printed paper should, of course, vary with the character of the room and the aspect. Halls and staircases look well hung with green, because the eye on entering a house is generally fatigued with the strong glare of daylight, and the green is the most refreshing. Studies and dining-rooms look well with dull reds in diapers or flocks, which may be enriched with gold; these form good back-grounds for engravings or pictures, but the reds or greens must never be positive colours, but low-toned and broken, so as not to disagreeably impinge upon the eye. In drawing-rooms, where the paper has to do more towards furnishing and beautifying a room, they may be more gay: almost any tone and shade of colour heightened with gold may be used provided always that the colours are so arranged and the forms so interwoven that a perfect balance be obtained and the eye never attracted to any one portion."

Our lecturer concludes with a few remarks on the necessity of an architectural education on the part of the public. "I have endeavoured," says he, "to establish, that, in all times but our own, all ornamentation resulted from architecture; that in the present age we have no guiding principle in its design or unity in its application; that the architect had abandoned to inferior hands that which was his especial province. I have described much of the disorder which has resulted from this, and have still more to add on the same subject. I will further endeavour to establish two points: first, that the education of our architects must undergo some change before we can hope that architecture and its attendant arts shall faithfully represent the wants, feelings, and faculties of our time; and, secondly, that this result can never be effectually obtained till a much higher amount of art-knowledge exists in us as a nation. How is any change for the better to be brought about? It is certain that the production of a national style must be, as it ever has been, a work of slow development; yet, if never attempted, the problem never can be solved. It seems to me, now that we have so many schools devoted to the improvement of design as applied to manufactures, and that a movement in this direction, aided by this society, is receiving a fresh impulse, that if the government were to undertake to gather together all the records of the past, and would disseminate that knowledge with correct principles for making use of it, a vast stride would be made in the right direction.

"The system of architectural education followed in France is very superior to that pursued in this country. Here the young architect is apprenticed to an architect in practice as to a trade, and is engaged for five or seven years on the works of his master: he gains thereby a good knowledge of construction and of the business of an architect,

but has but little opportunity of studying architecture as a fine art. In France, on the contrary, besides the drawing-schools which exist in every town, where the young may obtain much elementary knowledge, there are in Paris many studios where professors devote their time to the instruction of a large number of pupils, making them thoroughly acquainted with the works of every period, and giving them a thorough knowledge both of architecture as a fine art and of construction in theory. The pupils of these various studios are mostly attendants at the Architectural Academy, where they once a month produce designs in competition for a given subject; and they are assisted in the formation of these by their professors. One consequence resulting from this system is, that we see in France at any given period a much greater unity in the character of their works; and there is not that disorder and waste of forces which we see in this country, where each architect is pulling in a different direction. Works executed in France have a family resemblance not to be found in those of this country; the influence of the professor is much more felt, and schools of architecture are thereby formed, much as were the ancient schools of painting.

"All these architectural students do not become architects; those who do so, when they have finished their studies, become clerks of the works under government architects, where they learn the practice of their profession, and ultimately practise on their own account. Many of those who have not been sufficiently advanced, or who want government influence to be so placed, turn to other professions connected with architecture; become decorators and designers for manufacturers. It is this cause which gives to the designs of France the superiority they have. Mostly all their designers have had an architectural education. I do not mean to say that the French have made much more progress towards the formation of a national style than we have; what they have done is, that, at any one period, they have carried out the reproduction of any extinct style with much more unity. The fashion, as long as it lasted, has been general; and we do not see in France, as we see here every day, the building of one style of architecture, the decorations of another, and the furniture of a third, with every variety of age and period. However, it is the kind of education as pursued in France which I think it would be useful if our government could be prevailed upon to foster. The schools of design have not hitherto produced any marked improvement in the designs of our manufacturers, and have been conducted as if it were the intention only to make painters. The study of the human figure has been carried to excess, and much labour wasted upon it; useful as it is for refining the taste and teaching accurate observation, yet it is a round-about way of learning to draw for the designer for manufactures. I may here remind you that the Eastern nations, who appear to excel all others in their works of ornamentation, are forbidden by their creed to make any representation of the human figure; and it is, probably, to this cause that we may attribute their excellence in ornament. I cannot but feel, that if the education of the government schools were made more architectural, much real benefit would result to this country; besides that the study of architectural forms must be the best preparation for the designer of ornament, they would do more good in helping to make architects than painters, to whom individuality is less of an evil. Architects should be educated in masses, because it is their duty to give expression to common wants and common feelings. The opposite, system has been in use in this country, and has most assuredly failed. The knowledge we have acquired of the works of past ages has been procured by individual efforts, but, unfortunately, with but small results. Each has been tempted to exaggerate the importance of the style of his predilection, and which he undertook to illustrate. That a little knowledge is a dangerous thing has proved most true in architecture and its attendant arts. As each new architectural publication appears, it immediately generates a mania for that particular style.

When Stuart and Revett returned from Athens, and published their work on Greece, it generated a mania for Greek architecture, from which we are barely yet recovered. Taylor and Cresy did as much for the architecture of Rome. The travels of Belzoni and his successors produced the Egyptian Hall, and even Egyptian-faced railway tunnels. The celebrated French work on the architecture of Tuscany, and Letarouilly's 'Modern Rome,' have more recently inspired us with a desire for Italian palaces.

"The works of the elder Pugin and Britton, with a host of followers, have flooded the country with Gothic buildings; with which, notwithstanding the learning and research they exhibit, I must frankly avow I have but little sympathy. I admire and appreciate the Gothic buildings, which were the expression of the feelings of the age in which they were created; but I mourn over the loss which this age has suffered, and still continues to suffer, by so many fine minds devoting all their talents to the reproduction of a galvanised corpse. Instead of exhausting themselves in the vain attempt, who will dare say that, had these same men of genius, as they certainly are, directed their steps forward instead of backward, architecture would not have made some progress towards becoming, as it is its office, the true expression of the wants, the faculties, and the sentiments of the age in which we live? Could the new wants be supplied, the new materials at command, the new sentiments to be expressed, find no echo to their admonitions? Alas! iron has been forged in vain—the teachings of science disregarded—the voice of the poet has fallen upon ears like those of the deaf adder, which move not, charm the musician never so wisely. More than this; instead of new materials and processes suggesting to the artist new forms, more in harmony with them, he has moulded them to his own will, and made them, so to speak, accomplices of his crime. The tracery of Gothic windows, generated by the mason's art, have been reproduced in cast-iron; the Doric or Greek temples, which owe their peculiar form and bulk to the necessities of stone, have been but a hollow iron sham. We have gone on from bad to worse: from the Gothic mania we fell into the Elizabethian; a malady, fortunately, of shorter duration; for we then even worshipped not only a dead body, but a corrupt one. We have had an Italian mania without an Italian sky; and we are even now threatened with the importation of a Renaissance mania from France. It would be most unfortunate if the attention which has been directed to the peculiar beauties of the East Indian collection of the Great Exhibition should result in an Indian mania; but if this disease, like measles, must come, the sooner it comes and goes the better. What we want to be convinced of is, that there is good mixed with evil in all these styles; and I trust, when each has strutted its brief hour on the stage, recording for posterity the prevailing affectation of the day, we shall. We want to be convinced that all these styles do but express the same eternal truth, though in a different language: let us retain the ideas, but discard the language in which they are expressed, and endeavour to employ our own for the same purpose. We have no more business to clothe ourselves in mediæval garments, than to shut ourselves in cloisters and talk Latin; to wrap ourselves in Indian robes, than to sit all day on divans, leading a life of voluptuous contemplation. After the expression of so much heresy, I must beg to say that the fault does not at all lie with the architectural profession, to which I esteem it an honour to belong. The fault lies with the public; the public must educate themselves on this question. Architects, unfortunately, can but obey their clients; this one will have an Elizabethian mansion; this clergyman can admit no other than a mediæval church; this club of gentlemen must be accommodated in an Italian palace; this mechanics' institute committee must be located in a Greek temple, for there alone wisdom can be found or philosophy taught; this railway director has a fancy for Moorish tunnels or Doric termini; this company, again, an Egyptian suspension-bridge—the happy union of

the alpha and the omega of science; the retired merchant must spend his surplus in Chinese follies and pagodas. And, to wind up the list of these melancholy reproductions, I will cite the worst I ever saw, though, fortunately, not an English one. In the case of a client, who, requiring a steam-engine for the purpose of irrigation for his garden, caused his architect to build an engine-house in fac-simile of one of the beautiful mosque-tombs of the caliphs of Cairo. The minaret was the chimney-shaft. Nothing was omitted; even the beautiful galleries, which you all know were used for the purpose of calling the Moslem to his prayers, here surrounded a chimney without a means of access.

"I again repeat, the fault lies with the public; an ignorant public will make complaisant and indolent architects. Manufacturers, again, will always tell you, in answer to a reproach for the bad designs they produce, that they are only what the public require, and will have: let us trust that this excuse will no longer avail them. The Great Exhibition has opened the eyes of the British public to our deficiencies in art; although they were unable to suggest better things, they were found quite able to appreciate them when put before them. There must be on the part of manufacturers, architects, artists, and all who in any way minister to the wants and luxuries of life, a long pull and a strong pull, and a pull altogether; they have one and all, like dramatic authors, written down to the taste of the audience, instead of trying to elevate it. The public, on the other hand, must do their part, and exercise a little pressure from without.

"I know that I shall be told that the production of a new style of architecture is not so easy a matter; that it has never been the work of any man, or set of men, but rather something in the like of a revelation; for which, probably, we may be told to wait. Some will say architecture is a thing of five orders, discovered and perfected once for all, beyond which we cannot go, and all that is left us is an adaptation of it to our own wants; others will tell you that a Christian people should have no other than Christian architecture, and will tell us to go back to the thirteenth century in search of architecture, and that beyond this there is no salvation; but I answer, that this architecture is dead and gone; it has passed through its several periods of faith, prosperity, and decay; and had it not been so, the Reformation, which separated the only tie which ever existed between religion and art, gave to Christian architecture its death-blow."

We will at present, however, detain our readers no longer than to quote the farewell words of our lecturer, delivered at a time when the destruction of the Great Building in Hyde Park was talked of.

Decidedly in favour of its preservation, for the new Crystal Palace at Sydenham was not then contemplated,—"There is no doubt whatever," says he, "that the free mixing of the several classes which took place in the Great Exhibition has produced a feeling of higher appreciation of each other, both with the great and the humble; the great have a higher respect for the humble, the humble look with much less of envy on the great. Were the opportunity for this continued, the impression would become permanent instead of being transitory, or worse. This civilising influence, I say, would result from the empty building; but when we imagine, in addition, its vast nave, adorned with a complete history of civilisation recorded in sculpture from the earliest times to the present, with casts of the statues of our great men which now adorn our squares and public places, invisible from London smoke;—when we imagine the plants of every region, however distant, climbing each column, and spanning each girder;—the sides of the building set apart for the formation of collections, recording man's conquests over nature, where hundreds daily may be taught to see, with the mind as well as the eye, an education as necessary to the governors as to the governed; were such a scheme carried out nobly and lovingly, the success of the Great Exhibition would be, in comparison, failure itself. To effect this, and in further developing the movement in favour of

bringing art-knowledge within the reach of all, the government may do much, but the public must do more; it must depend for success on the co-operation of all. It is a movement that may not be delayed; we must be up and stirring, if we would not that England, in the midst of her material greatness, become a byword and a reproach amongst nations."

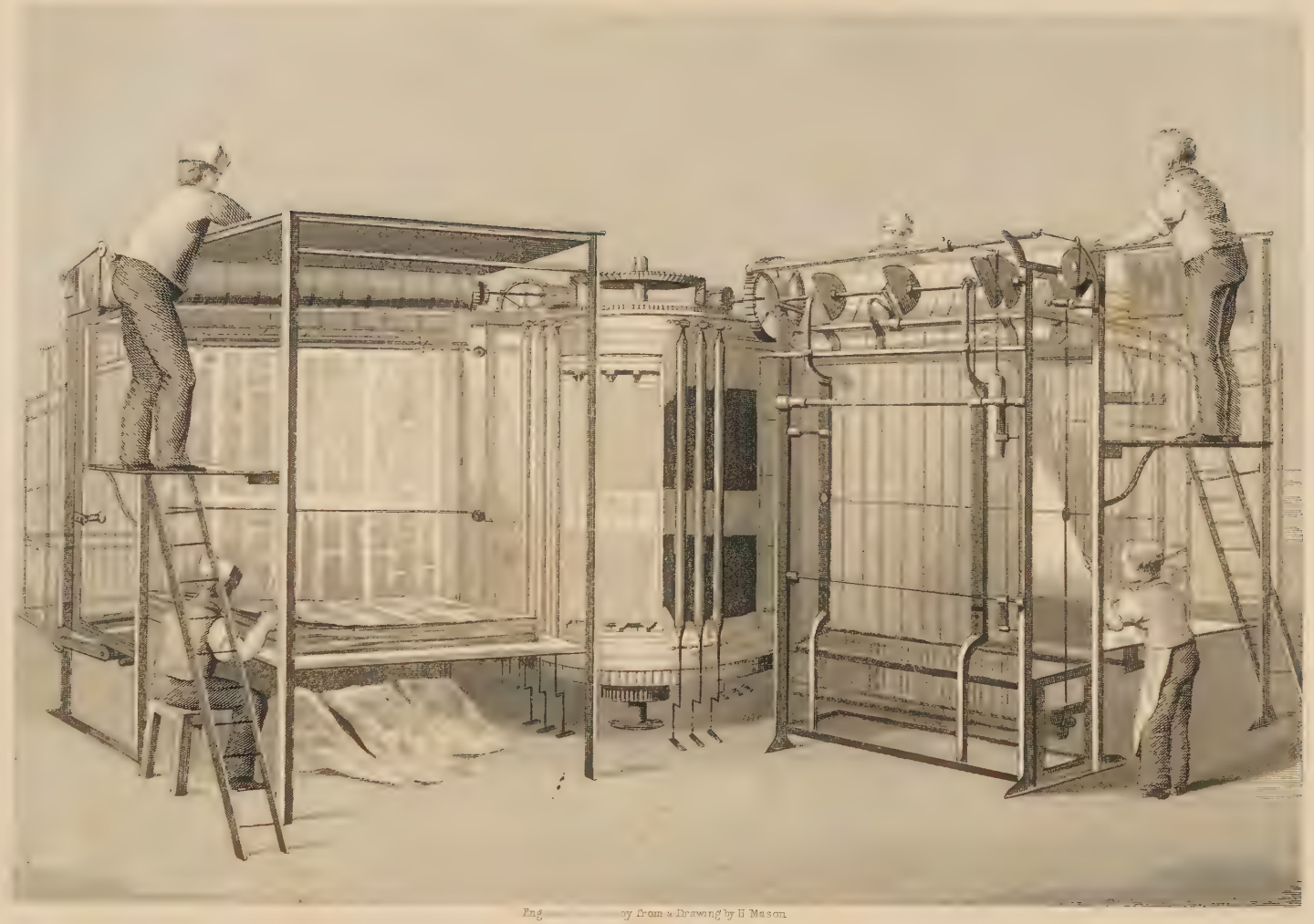
CHAPTER XXXI.

PRINTING.—*From the Juries' Reports.*

INVENTION OF PRINTING—ITS EARLY HISTORY IN GERMANY, FRANCE, AND ITALY—ITS INTRODUCTION INTO ENGLAND—GREAT IMPROVEMENTS IN THE ART—APPLEGATH AND COWPER—VAST INCREASE IN BOOKS—NEWSPAPERS—THE "TIMES"—AUSTRIA—PRUSSIA—SAXONY—ITALY—THE VATICAN—ENGLAND—CAXTON—BULMER—BENSLEY—WHITTINGHAM, ETC., ETC.—CHROMOTYPY—PRINTING IN GOLD—PRINTING IN FRANCE, ETC., ETC.

After the interval of four centuries, the date of the Great Exhibition of the world's industry was coincident with the anniversary of that of the invention of printing. It seemed as if all nations were assembled in the capital of England to celebrate the centennial birthday of the press—the most powerful instrument of their civilization. It is by the aid of printing that different nations have imparted to each other their thoughts and their feelings, and have received in some degree a combined existence. Without this marvellous bond, they would have been left to the ignorance and prejudices which foster nations' warfare, and could never have presented this admirable display of universal harmony and of general emulation. When we consider the great costliness of manuscripts at a former period, the difficulty of procuring them, and all the benefits of which society was devoid before the discovery of printing, every friend of study and of exalted intellectual speculations should deem himself fortunate in living at a period when so many stores of instruction are placed within the reach of all.

In every age, and in all countries, printing denotes the state of civilization, of which books are the reflex, and the history of the human mind is written in the progress of bibliography. Thus the first printed books of Germany were almost all devoted to theology and scholastic philosophy, while at Paris ancient literature occupied an equal rank with theology; thus, also at Rome, where the remembrance of ancient literature maintained a still stronger empire, printing, under the guidance of the bishops of Aleria and Teramo, principally reproduced the master-pieces of classic times. In France, however, under the influence of the chivalrous reign of Francis I., a great number of works upon chivalry soon appeared, and the desire of becoming acquainted with narratives so much in conformity with the prevailing taste, was one cause of the introduction of printing into England. Of the sixty-two works printed in England by Caxton, those upon theology do not amount to ten, the remainder being devoted to chivalry, to history more or less romantic, to literature, and to manners and customs. Without expatiating upon this subject, we will confine ourselves to observing that, at the period when the pope founded at Rome the celebrated printing-office for the "Propagation of the Faith," there was no corresponding activity on the subject in London; and, that, at the present day, whilst the great printing establishment of the "Propaganda" remains inactive, England, every year, sends forth to the world a million of Bibles and New Testaments.



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AS USED BY THE ILLUSTRATED NEWS AND THE TIMES NEWSPAPERS

Soon after its first origin, the art of printing had attained a great degree of perfection, and it was not till the second half of the last century that, owing to the efforts of Ibarra, in Spain; of Baskerville and of Bulmer, in England; of the Foulises and the Ruddimans, in Scotland; of Bodoni, in Italy; and of the Didot family, in Paris, any real progress can be pointed out. The types were better cut and better cast, the ink as good as that of the earliest printers, the paper was improved in its make, and the press-work more uniform. At that time the greatest admiration and astonishment were created by the rapidity with which, at each action of the lever, moved by the hand of the workman, all the pages which a whole sheet of paper was capable of containing, were imprinted at a single stroke; but this rapidity which enabled a workman to produce in one day more than a thousand transcribers could write, could not long suffice to supply the constantly increasing demands caused by the march of intellect.

About the beginning of the present century, Charles, the third earl Stanhope, by the invention of the press which bears his name, and a new process of stereotyping, more simple and more economical, had made a great improvement in the typographical art. Subsequently Messrs. Bauer and Kœnig, aided by the genius and knowledge of English engineers, and by the intelligence and perseverance of Messrs. Bensley and Walter, applied steam power to a new system, which created a revolution in the art of printing. In lieu of the platten, which the workman's arm slowly brought down upon the types, two cylinders printed with rapidity both sides of the sheet, whatever its size might be. In November, 1814, by means of this machine, which was subsequently much simplified, the *Times* newspaper was printed with a rapidity which surpassed Guttemberg's press even more than the latter did the hand of the transcribers. It might have seemed that the rapidity of production in printing could proceed no further; but, after having been repeatedly altered in its form, the printing machine appears before us now in an entirely novel shape; and we might believe, on seeing the *Times* newspaper printed by Applegath's new system, that the highest degree of speed had been attained, did not experience prevent mankind from assigning a limit to the perfectibility of human inventions, and to the inscrutable designs of Providence.

M. Kœnig's machines, patented in 1814, were far too complicated and expensive, and the inking too imperfect, for general adoption. They were superseded by Mr. Edward Cowper's machine, which he invented and patented in 1816. Almost all the large editions of modern works are printed by Cowper's machines, and the influence they have had on the publication of books of all kinds is far beyond any expectation entertained at the time the machine was invented. After it had been in use sometime, it was stated in court, by an eminent lawyer, (now a noble lord), that, "if it had not been for Mr. Cowper's machine, it would have been impossible to supply the demand for books:" this is not correct, for at that time the hand-press *did* supply the demand: but the striking and important fact is, that the *machine* created a demand, and called into existence books which, but for it, would scarcely have been thought of. As the machine-work from type and wood-cuts was far better than the ordinary printing of the day, booksellers were induced to print extensive editions, because they saw the machine could accomplish all they required. One of the first booksellers who availed himself of this power was Mr. Charles Knight, who projected the *Penny Magazine*, on a hint from Mr. M. D. Hill, Queen's counsel. Each number, published weekly, consisted of eight pages of letter-press, illustrated with good wood-engravings. The public was astonished at the cheapness and good quality of the work, but it was its immense sale which rendered it profitable; for some years it amounted to 180,000 copies weekly. Mr. Knight, whose services in the cause of educational literature entitle him to the highest praise, expended £5,000 a-year in wood-cuts for this work. The Cowper machine has been the

cause of the many pictorial illustrations which characterise so large a portion of modern publications. The *Saturday Magazine, Chambers' Journal,* the *Magazin Pittoresque,* in France, and numerous others owe their existence to this printing-machine. The principle of *cheap editions and large sales* soon extended to established works of a higher value. A remarkable instance of this was the edition of sir Walter Scott's works; instead of the old price of ten shillings, they were sold at five shillings a volume, and the demand created by this reduction of price was so great, that, although the printer had a strong prejudice against machines, he was compelled to have them, the presses of his large establishment proving totally unable to perform the work, which amounted to upwards of 1,000 volumes per day, for about two years. The Universities of Cambridge and Oxford have adopted Mr. Cowper's machines for printing vast numbers of Bibles, Prayer-books, &c. &c. A Bible which formerly cost three shillings, may now be had for one shilling. Mr. Cowper recommended the Religious Tract Society to put aside their coarse wood-cuts, to have superior wood engravings, and to print them with his machine. The Society adopted these suggestions, and the result is, that by sending forth well-printed books, it could now support itself by their sale, without any aid from subscriptions.

As to newspapers, the *Times,* for instance, prints about *thirty-five thousand* copies every day, and as this newspaper is of a very large size, often with a supplement, the aggregate amount is more than thirty acres of printed surface per day—a quantity that could not possibly have been effected by hand-presses. At the *Times* office there are four machines, invented by Cowper and Applegath, printing from 4,500 to 5,000 impressions per hour—a hand-press producing only 300 impressions per hour. The great point obtained in these machines is the perfect distribution of the ink, and the power of causing the type to pass under the inking-rollers twice for newspaper-work, or from four to eight times for book-work, thus insuring the type being well inked. The effect was so striking, as to induce Mr. Cowper to apply the inking-roller and table to the common press, and this method has entirely superseded the old printing-balls, and completely abolished the imperfect inking, technically called "monks and friars," so frequently seen in books printed by the old system. The effect of Mr. Cowper's ingenious invention is, that books are well, cheaply, and quickly printed, an abundance of illustrations introduced, and the quality of printing improved all over the world; thus rendering literature accessible to millions.

Austria.—Printing invented at Strasburg and Mayence, and patronised by the emperor Maximilian, who obtained master-pieces from it at its commencement, appeared in the Exhibition, with a degree of splendour which caused general surprise. No less encouraged in our day by its present sovereign, the Imperial printing-office of Austria has proved itself equal to its duties, and has accelerated the progress of the art by numerous experiments of all kinds. Xylography, engraving, type-founding, stereotyping, whether by plaster moulds, or by means of gutta-percha and the galvano-plastic process, electro-metallurgis, by which fossil fishes and animals buried in the antediluvian era are reproduced upon paper; galvanography, galvanotype, chymitype, all those new appliances of art and science which dimly foreshadow an unknown future, were represented there; and lithography, that new sister of typography also appeared, with the new adjuncts of chromotypy and chromo-lithography.

By the side of so many objects relating to typography, we were compelled to admire the typographic plates, each measuring 540 square inches, formed by the galvanic process, and producing in copper, letters of all languages, from which many millions of copies may be printed without appearance of wear and tear.

Prussia.—Next to the imperial printing-office of Austria, we noticed that of M. Decker, the printer to the Royal Academy of Berlin. The large folio New Testament, the German

translation by Luther, was a master-piece of typographic art. The printing of it was perfect; the types were well cut and cast, the ink was black and brilliant, and the paper excellent. Great praise must also be accorded to the edition of the complete works of Frederick the Great, a literary and typographic monument of great beauty, raised by Prussia to its hero. The five volumes in large quarto, already published, were worthy in every respect, by their typographic execution, of the importance of such a work. M. Decker exhibited, amongst the specimens of types from his foundry, some Oriental types, engraved in part with the co-operation of the Academy of Berlin; and also specimens of brass rules, of great depth in the engraving, and of very superior execution. M. Liepmann's ingenious invention for printing in oil, from a mass of solid colours, as a substitute for semi-fluid printing inks, attracted the notice of the jury, and they hope that when it has been sufficiently improved, it may be a valuable adjunct to ornamental printing. M. G. Westermann, of Brunswick, showed a specimen of good printing, in the work entitled *European Gallery*, printed upon German paper. From Eberfield, M. Baedeker's *German Bible*, in folio, was a specimen of small and neat type printing. M. Haenel, of Berlin, exhibited bank-notes and labels, in gold and colours, possessing some merit.

Saxony.—M. Hirschfeld's of Leipzic, and some other typographic establishments, maintain printing in an honourable position in Germany. In general, the jury have observed, in all the books exhibited in the German department, great improvements in the paper, in the clearness and neatness of the type, and the quality of the ink.

Italy.—Printing, soon after its discovery, was carried to Rome by some German printers. The popes, Sixtus V., Leo X., and Clement XIV., founded the celebrated printing-office of the Vatican, for the purpose of printing the works of the holy fathers and the Holy Scriptures, and of propagating the Catholic faith. Their beautiful Oriental types give this printing-office an honourable standing, but its publications are few, and do not keep pace with the progress of the times. The Vendelins of Spires, and the Jensons, were early established in Venice. They introduced some happy modifications into the types, by making them approach nearer to the beautiful letters of Roman inscriptions. The Aldi still further improved them, and invented the sloping types called *italic*. Their beautiful and erudite publications, are remarkable even in the present day, for their typographic execution. At the end of the last century, and at the commencement, of the present, Bodoni, a typographer of consummate skill, who was at the same time, the engraver and founder of the types which he so carefully printed, published his beautiful editions—true master-pieces—which have earned for him the highest renown; but in which, he perhaps sacrificed too much to typographical luxury. Italy sent but few typographical productions to the Exhibition; nevertheless, the Jury remarked with interest, the large folio volume of *the History of the Abbey of Altacomba*, skilfully printed at Turin, by MM. Chirio and Mina. The type was very beautiful, and each page was surrounded by a border, imitated from one of the exquisite manuscripts of the fifteenth century. The wood engravings have been multiplied by the galvanoplastic process.

England.—The first book printed by Caxton, after a long residence in the Low Countries, appeared in London, 1474; and it is worthy of note, that the first book in the English language was printed by him, not in England, but on the continent, in 1471. Almost all those which he printed, and which he translated himself, to please the Princess Margaret, sister of King Edward the Fourth, and at the solicitation of the great lords and ladies of that time, were devoted to chivalry. His types, and those of his successors, Wynkyn de Worde and Pynson, are a not very elegant imitation of the writing then used in England. Up to the time of Buckley, in 1733, the art of

printing made little progress in this country. It was Baskerville, who, in 1750, turning his thoughts from japanning to type-founding and printing, first gave to the art a real impulse. He spent several years and much of his fortune before he was able to produce types to his own satisfaction. In 1757, he issued his first book—a "Virgil," in quarto. Between this date and 1763, he printed those charming editions of "Milton," "Addison," the "Common Prayer," the "Bible," "Juvenal and Persius," "Horace," &c., which are still celebrated for their typographical beauty, and cause the name of Baskerville to be ranked among the most eminent men who have contributed to the improvement of the art of printing. The paper which he caused to be made was superior, and all his apparatus for printing, including his ink, presses, chases, punches, matrices, moulds, and types, were produced by himself, and were all great improvements. His process of drying and glazing his paper and ink, as soon as printed, by means of hot plates of copper, was expensive, and had some other faults; but the taste of the period was not then ripe for luxury in printing; and, notwithstanding too, he offered to print for the London booksellers within five per cent. as low as the printers they employed, he complained that he was unable to get work from them. Accordingly, in 1767, we find him writing to his old friend Franklin:—"After having obtained the reputation of excelling in the most useful art known to mankind, of which I have your testimony, is it not to the last degree provoking that I cannot even get bread by it?" Then, as now, many persons would encourage bad printing, because it was cheaper. His types, though rather lean for large books, were held in much estimation; and, in 1779, four years after his death, were sold to a literary society in Paris for £3,700, and were in 1784, first employed in printing Beaumarchais' celebrated edition of "Voltaire," in seventy volumes, a work at that day unsurpassed in typographical luxury. Thus ended the first real attempt at improvement in England.

At the end of the last century, Mr. William Bulmer and Mr. Thomas Bensley made a fresh progress in the art of printing. Their beautiful publications rivalled the most remarkable productions of France, Spain, and Italy; and the magnificent edition of the works of "Shakspere," in nine folio volumes, embellished with engravings after the most able artists of England, and printed by Bulmer with great skill, excited the zeal of MM. Didot, who wished to raise in France a like monument to Racine, and printed a folio edition, unequalled for its typographical perfection. At the commencement of the present century, Mr. Charles Whittingham brought out the elegant editions, which have rendered the Chiswick press so celebrated. Until that time, no one had printed wood engravings so perfectly, by the application of *overlays*, necessary for obtaining gradations in the tints. This success encouraged the engravers to give to wood-cuts a fineness unknown in the times of Albert Durer, Wolmeguth, and other engravers, who were obliged to employ broad lines, the unevenness of the paper and the imperfection of the presses rendering the printing of fine lines impossible. At the present day, when speed is imperatively demanded by the public, the means of satisfying this demand, are everywhere numerous and powerful. The fact may be judged of in London by the printing-office of Messrs. Clowes (printers of the *Official Catalogues*, and of the *Reports by the Juries*), in which two steam-engines put in motion twenty-six printing-machines; and by that of the printing-offices of the *Times*, and other large London newspapers, which publish in the morning the long debates in parliament, so often continued until late in the night. This rapidity of execution would have appeared fabulous in the last century; and it ought to be remarked, that the speed does not, in England, in any way prevent the correctness of the work, which is in general remarkable, even in the immense daily newspapers. This advantage must be attributed, in a great measure, to the maintenance of the ancient custom of the printers in England. Here it is required that

there should be seven entire years' apprenticeship of every working printer, whether he is destined to be a compositor or a pressman. This beneficial custom, by means of which the workman becomes more skilful and more attached to his profession, is gradually re-establishing itself in all the countries in which, by reason of political commotions, it had faller into disuse, to the great detriment of the art.

While in most other countries in Europe, the patronage of the government appears indispensable to the creation or the development of a great number of branches of industry, more or less intimately connected with the fine arts and science, England affords a striking instance of how they are capable of being matured and developed without this support. The strength of its institutions, its spirit of association, the immensity of its capital, and its indomitable perseverance, enable the typographic art to develop itself solely by its own resources. The Tract and Bible Societies, which have printed the Holy Scriptures in all languages, are a remarkable proof of the power ot association, animated by a religious spirit. The numerous and voluminous encyclopædias, of which the *Encyclopædia Britannica* alone, in twenty-six large quarto volumes, has reached its seventh edition, and the large number of important popular publications, also prove the immense resources of this country.

Although neither of the great universities of Oxford and Cambridge took any part in the Exhibition, the jury commemorate the high merit of the Clarendon press in the one, and of the Pitt press in the other. During a long series of years, Oxford has been remarkable for the well-sustained beauty of its Greek and Latin publications, as well as of those in the English tongue. Mr. Parker, the bookseller of the university of Oxford, exhibited as a publisher, several works on mediæval architecture, remarkable for their correctness, the beautiful execution of the wood engravings, and the goodness of the paper.

The jury strongly regretted, and this regret has been recorded on their minutes, that almost the whole of the printers of England refrained from exhibiting the beautiful productions of their presses, owing to the instructions given to the local commissioners, which stated that printed books were inadmissible. However, some fine specimens of good printing crept in by mere chance, such as Messrs. Bradbury and Evans's beautiful work of Mr. Marryat, *Collections towards a History of Pottery and Porcelain,* neatly executed; Mr. Pickering's *Victoria Book of Common Prayer,* in large Old English type, the Rubrics in red. This book had been carefully collated with the sealed book in the Tower of London. It was on superroyal paper, made by Mr. T. H. Saunders, of Dartford, Kent; it was hand-made, hard tub-sized, from fine strong rags, without any artificial colour; the moulds were made expressly, the wires finer and closer placed, to imitate the old moulds. This is a supplemental volume to Pickering's series of the Common Prayer, which shows all the changes made in the Ritual from the Reformation to the Savoy conference. *The Booke of Common Prayer, noted by John Merbeke.* This is a verbatim reprint, showing what parts of the service were chaunted in the reign of Edward VI.; the notes are black, on red ledger-lines; the paper the same quality and make as the "Victoria Prayer-Book," but in water-leaf, without size. Also the first six books of "Euclid," with the diagrams and symbols printed in colours, which are used instead of letters, for the greater ease of learners: all these were from the press of Mr. Whittingham. Mr. Bagster's well printed and useful "Polyglot Bibles;" Mr. Mackenzie's, of Glasgow, good specimens of Church Text, illuminated with red capitals; Messrs Reed and Pardon's neatly executed specimen of their founts; Mr. Smith's specimens of Hercules Ellis's Poetry; Major Bell's well-got-up *Tables of Universal History,* &c. &c. The same principle which prevented the English printers from exhibiting their works also deprived the publishers of the opportunity of taking, at the great Exhibition of all Nations, that high position to which their beautiful and carefully edited works would have justly entitled them. The names of Longman,

Murray, Moxon, Bohn, Pickering, and of a great many others, are for ever inseparable from the history of English literature; and thousands would again have seen with satisfaction, and have shown with pride to foreigners, the numerous, cheap, neatly printed, and beautifully illustrated productions of Mr. Charles Knight, who, in ministering to the intellectual wants and pleasures of the people, has given in the right direction an impetus which is still felt in all branches of art and manufacture connected with this class.

Chromotype, or Printing in Colours.—Hugo di Carpi is said to be the original projector of printing chiaro-oscuro by surface block-printing. In 1754, *Jackson's Essays on the Invention of Engraving and Printing in chiaro-oscura*, as practised by Albert Durer, Carpi, &c., was published. The editor in his preface states, that, "besides the superiority of taste," there is "yet a very essential advantage belonging to this mode, which is, that being done in oil, the colour will never fly off. By this means the same beauty continues as long as the paper can hold together." Unfortunately for this speculative opinion, after the lapse of 100 years, the colour of the ink did "fly off," for the specimens of the wood-cuts in oil scarcely retain any of the colours which were supposed to be imperishable as long as the paper lasted. The paper, on the contrary, continues good and strong to this day. The jury proceeds to state the causes of the neglect and decline of the art of printing in colours, and its subsequent revival in 1832, chiefly through the discoveries of Mr. De La Rue, and speaks in terms of high commendation of the plates executed by Baxter. M. Silbermann, of Strasburg, also received praise for the productions he exhibited, such as the painted window of the Strasburg cathedral, and some imitations of manuscripts, enriched with coloured vignettes, by surface printing.

Printing in Gold.—Dibdin, in his *Decameron*, states that "This country has also an honour and a treasure to boast of in Mr. Whittaker's 'Magna Charta,' printed in letters of gold, with illuminations. There are some copies on vellum, beautiful, splendid, and characteristic, beyond any similar work (I had almost said ancient as well as modern) which it has ever been my good fortune to behold. Indeed, taking it 'all in all,' those who have not seen such a union of typographical and graphical skill as those illuminated copies display, can have no idea of the extraordinary felicity of their execution." The method adopted by Mr. Whittaker is the following, for which the jury is indebted to the kindness of Mr. John Harris, who was employed on the work. The page is composed in moveable type in the usual way; a stereotype plate is taken. A piece of iron of the size of the page, about half an inch in thickness, is made hot, and placed on the table of an ordinary typographical printing-press; the stereotype plate is then placed on the iron plate, and gets hot, and leaf-gold of an extra thickness, of the size of the plate, is laid very carefully on the surface of the plate; then the paper or vellum is placed on the tympan in the usual way, having been previously sifted over with dried glare of egg and rosin, finely pulverised, which adheres to it in sufficient quantity; the tympan is then turned down, and the pull dwelt on. The degree of heat must be ascertained by practice; if the plate be too hot, the gold is dead and drossy; if too cold, then it appears bright but imperfect. This process is similar to that now used by bookbinders in block gilding with an arming-press. Printing in gold by letter-press soon followed the method of copper-plate gold printing. Messrs. Vizetelly and Branston were the first to apply it; and their visiting and address cards, printed by letter-press, from rose-engine plates, have never been surpassed for the brightness and beauty of execution. About the same period Mr. De La Rue, in conjunction with the late Mr. Balne, of Gracechurch-street, produced a large royal 8vo. edition of the New Testament, printed in gold, twenty-five copies of which were in pure gold powder. Nothing has since been produced equal to this unique edition. At the coronation of Queen Victoria, Mr. De La Rue undertook to produce the *Sun* newspaper printed in gold. The rapidity with which this had to be

effected was one of the many difficulties he had to encounter. Messrs. Clowes and Sons afforded him every aid by placing at his disposal the printing machines of their extensive establishment. Upwards of 100 persons were employed to rub the bronze on the printed sheets, which had to be brought from the printing-office in Stamford-street, as soon as printed, to Mr. De La Rue's works in Bunhill-row, to be there bronzed and finished. More than 100,000 copies were thus produced; 10,000 in time for the publication of the *Sun* on the coronation-day. Gold printing is now applied to numerous purposes in most countries. The following is the best method of producing good and bright results of letter-press printing. Take the best printer's varnish, grind it to a thick consistency with the best burnt sienna or brown umber, and reduce this with De La Rue's gold-size until it be of the thickness of thin treacle; ink the form in the usual manner, and when printed apply the bronze by rubbing it gently over the article with cotton wool. If leaf-gold or leaf-metal is required, it must be laid on carefully, and when dry, the sheets should be wiped, to clear them of the superfluous bronze or metal. The gold printing is much improved by its being passed over polished steel plates, between powerful rollers. There were many exhibitors of printing in gold and silver, bronze, and in metal, displaying a variety of specimens, all possessing merit.

Printing in France.—As early as 1470, printing was introduced into Paris by the influence of La Sorbonne: its progress was rapid. Rembold, the partner of Géring, Antoine Vérard, Simon de Colines, Pigouchet, and others, carried the art of printing to a high degree of perfection. The typographical merit of the publications of Robert and Henry Stephens would itself be very remarkable, were it not surpassed by the high literary merit of those learned printers. The national printing-office of France was founded in 1640 by Louis XIII., who there collected the punches cut by Garamond by order of Francis I., and confided these punches to the most eminent printers of his time, who were honoured with the title of *Royal Printers*. Under the preceding reigns, this printing-office had distinguished itself by large publications, such as the collection of ordonnances of the kings of France, that of the fathers of the Church and of the Councils, and that of the Byzantine historians, &c. At the fall of royalty it became a vast establishment, in which was concentrated all the printing of the government departments —divided hitherto among private printing-offices. Napoleon confided the direction of it in 1809 to M. Marcel, who had accompanied the expedition to Egypt, and had founded a printing-office at Cairo. Making use of the types of the Propaganda of Rome, which had been removed to Paris, M. Marcel printed the Lord's-prayer in 150 languages. It was especially under the reign of Louis Philippe that the printing-office, then a royal establishment, improved its means of execution, and caused a great number of Oriental types to be engraved, under the special direction of the most learned Oriental scholars. The 150 foreign founts in the specimen-book of the national printing-office, offer an interesting subject of comparison with the rich collection of the Imperial printing-office of Austria. The jury particularly remarked the pure taste and perfect execution of the borders printed in gold and in colours, in imitation of the drawings and vignettes of the elegant Oriental manuscripts. The typographic execution, with reference to the types, the harmony, the clearness, and the purity of the designs executed by MM. Chenavard and Clerget, was perfect. Nothing could be more beautiful than the three volumes of the Oriental collection sent by the national printing-office. The jury found the bookselling business of Paris honourably represented in the Great Exhibition by MM. Renouard Baillière and Gaume; for the sciences and literature by MM. Langlois and Leclercq; and by M. Pagnerre for educational works; by MM. Bance, Gide, and Charles Texier for architectural works; by M. Mathias for his industrial and scientific library, so suitably adapted to the wants of mechanical science; and, lastly, by Madame

Huzard, for works upon agriculture. French printing was honourably represented at the Great Exhibition; for Paris, by M. Dupont, whose extraordinary productions of fac-similes, of old books, in the style of anastatic reproductions, and whose general specimens of printing, as exhibited, deserved particular mention; by M. Didot, who has raised monuments worthy of the old masters in his last three great publications,—The *Thesaurus* of Stephanus, Ducange's *Glossarium,* and *Bibliotheca Scriptorum Græcorum*— all produced in a country village, the whole of the composition of the types being made by young girls; by MM. Plon, Brothers, whose books, albums, &c., were of great merit; by M. Claye, whose illustrated books were of the first workmanship; and for the provinces by MM. Mame, who exhibited books neatly bound and fairly printed, at most extraordinary low prices; by M. Silbermann; by M. Desrosiers, who, in a small provincial town, produced his *Ancient Auvergne,* &c., in a very creditable manner; and by M. Barbat, who exhibited illustrated volumes of the Scriptures.

The jury regretted that neither from Spain nor Portugal were there exhibited any proofs of the present state of printing in those countries. Denmark also was unrepresented. From Belgium and the Netherlands there were but few specimens. Russia displayed "a single broadside sheet." Sweden, some good specimens of printing bank-notes by letter-press. Persia sent some beautiful manuscripts only, and some books printed in Europe. Egypt had an interesting display of 165 volumes, printed in Arabic, in Turkish, and in Persian, at Cairo. Amongst these books some were enriched with Arabesque, tastefully executed by means of typography. These were printed upon a peculiar paper, manufactured at Boulac, by the old vat process. The pulp appeared to resemble that which is produced in China and in India by the use of raw materials, such as the bamboo and the banana-tree. It may be that the ancient papyrus is now re-appearing in Egypt under this new form.

United States of America.—It is well known that there are some works printed in the United States which give a more favourable idea of the productions of America than those which appeared in the Exhibition. The American printers contented themselves with sending a number of newspapers, the printing of which was not remarkable. From Canada, the jury noticed some beautiful types from the foundry of Mr. Palsgrave, at Montreal, who also exhibited some stereotype plates.

Australia.—The jury examined with real interest several works printed in Van Diemen's Land, at Hobart Town, by Henry Dowling; and two large volumes, accompanied with lithographs, likewise designed and printed in Australia. The same might be said of a a work printed at Sydney, by William John Row.

It is to be regretted that—introduced as it now is, even to the confines of the earth— all the productions of the press were not represented in the "universal gathering;" for printing is a gift almost as necessary to man as speech, for the manifestation of his thoughts.

CHAPTER XXXII.

THE ORIGIN OF EXPOSITIONS.

MARQUIS D'AVEZE—CHATEAU OF ST. CLOUD—PLAN OF THE FIRST EXHIBITION—DIFFICULTIES AND EXPULSION OF THE MARQUIS — RENEWED ATTEMPT AT THE MAISON D'ORSAY — THE TEMPLE OF INDUSTRY — THE FESTIVAL OF LIBERTY—MAGNIFICENT CORTEGE—EXHIBITION OF 1801—SPANISH AND BELGIAN EXHIBITIONS—VARIOUS LOCAL EXHIBITIONS IN ENGLAND—DESCRIPTION OF THE FRENCH EXPOSITION BUILDING, ETC.

Not to fatigue our kind readers with too long a wandering among the numerous recesses of the Crystal Palace, or too close an investigation of its various treasures of industry, of science, and of art, we will endeavour, for a brief space, to diversify the scene and introduce them to the acquaintance of the Marquis D'Avèze, who has favoured us with an interesting account of

THE ORIGIN OF EXPOSITIONS.

Rather more than half a century since—1897—the first Exposition of the National Industry of France took place in the chateau of St. Cloud, under the presidency, and through the agency of the above-named nobleman. During the troubles of the revolution, he found that the royal manufactories of Sèvres and Gobelins had suffered, and that the workmen were wanting bread, though the warehouses were full of the choicest tapestry, china, and rich wares. To remedy this sad state of things, he bethought him of the sale of these products in a bazaar; and in a few days, he tells us, the castle-walls were gay with hangings and the floors bright with the carpets, and the tables with china and bijouterie. But the marquis has told the history of the affair so well, that we may use his own words:—"In the year V. of the Republic (1797), I had not yet quitted the Opera, when the minister of the interior summoned me to undertake the office of Commissioner to the Manufactures of the Gobelins (tapestries), of Sèvres (china), and of the Savonnerie (carpets). I had no need to stay long in these establishments, to perceive the misery in which they were plunged. The workshops were deserted: for two years the artizans had remained in an almost starving condition; the warehouses were full of the results of their labours, and no commercial enterprise came to relieve the general embarrassment. Scarcely can I depict the effect produced upon me by such a scene; but at that moment a sudden and luminous thought presented itself to my imagination, and appeared to console me for the miseries of the present in the hopes it offered for the future. I pictured to myself, in the most glowing colours, the idea of an exhibition of all the objects of industry of the national manufactures. I committed my project to paper; I detailed the mode of its execution; and prepared a report, addressed to the minister of the interior, which was written throughout by my own hand, and delivered by me to M. Laucel, then at the head of the section of arts and manufactures, in whose office the document in question should still exist. My report soon received the approbation of the minister of the interior, M. François de Neufchâteau, who commanded me to carry it into effect by every means useful and suitable to the government. The château of St. Cloud was then uninhabited and completely unfurnished; and this appeared to me the most appropriate and eligible spot for the exposition which I had projected, and likely to invest the exhibition with all the magnificence and éclat so necessary to attract strangers, and to further the sale of the objects exhibited, the produce of which might mitigate the sufferings of our unhappy workmen. The château of St. Cloud was obtained without

difficulty. I established myself there, and requested the attendance of MM. Guillamont, Duvivier, and Salmon, directors of manufactures. I explained to them the intention of the government, and found all these gentlemen ready to further this object with zeal and activity. In a few days, by their obliging exertions, the walls of every apartment in the château were hung with the finest Gobelin tapestry; the floors covered with the superb carpets of the Savonnerie, which long rivalled the carpets of Turkey, and latterly have far surpassed them; the large and beautiful vases, the magnificent groups, and the exquisite pictures of Sèvres china enriched these saloons, already glowing with the *chefs-d'œuvre* of Gobelins and the Savonnerie. The Chamber of Mars was converted into a receptacle for porcelain, where might be seen the most beautiful services of every kind; vases for flowers; in short, all the tasteful varieties which are originated by this incomparable manufacture. In the centre of the saloon, surrounded by all these beauties, was a wheel of fortune, containing lottery-tickets eventually to be drawn: every ticket was to obtain a prize of greater or less value; the price of each ticket was twelve francs. I had attained to this point, when the minister gave me an assistant in the person of M. Lessure, a young man of great merit, with uncommon zeal and inteliigence. I had already, for some time, enjoyed the advantage of the services of M. Peyre, a young architect of exquisite taste and distinguished talent. He it was who superintended the arrangement of the exposition; and when this was completed, I referred to the minister to fix the day for its being opened. It was decided that this should take place in the month of Fructidor; but, previous to that time, a number of distinguished persons in Paris, and many foreigners, visited the exposition, and made purchases sufficient to afford a distribution to the workmen of the different manufactures, thus yielding a little temporary relief to their necessities. The fame of this forthcoming exposition inspired the citizens of Paris with an eager desire to enjoy it as soon as possible; they anticipated with impatience the 18th Fructidor, the day fixed for public admission to St. Cloud. The court-yard was filled with elegant equipages, whose owners graced the saloons of the exposition, when, in the midst of this good company, I received an official notice from the minister to attend him immediately, and to defer the opening of the exposition. I obeyed the mandate on the morning of the 18th. I waited on the minister, from whom I received an order to close the château. Already on the walls of our city was placarded the decree of the directory for the expulsion of the nobility, with an order for their retirement within four-and-twenty hours, to a distance of at least thirty leagues from Paris, and this under pain of death. My name was in the list; and, consequently, my immediate withdrawal was imperative. The barriers were strictly guarded, and it was impossible to pass them without the order of the commandant. My position was doubly painful: on the one hand, it was essential to obey the decree of the government; on the other, I had an account to render of all the treasures in the château of St. Cloud. I found no difficulty in explaining my situation to the minister and the commandant of the place, the Marshal Augereau. I requested him to furnish me with sufficient force for the protection of the château, in which so many precious objects were deposited. He gave me a company of dragoons, under command of Captain Vatier, and ordered a passport for me, by means of which I could leave Paris and return to St. Cloud. I caused an inventory to be made in my presence, of all I left in the château. I closed the gates and delivered the keys to M. Maréchau, the keeper, in compliance with the order of the minister. I posted the military which had been granted to me around the château, and, my duties fulfilled, hastened to obey the decree of the proscription. Such is the true and exact history of the first idea of National Exposition, and of the first attempt to realise that idea."

The modest narrative of the originator of these exhibitions was written by the marquis

so late as the year 1844, in reply to the reports of MM. Challamel and Burat, in which the honour of their origin was accorded to François de Neufchâteau. The labours of the marquis, however, in the cause of the industrial arts did not terminate with his compulsory retirement; for, on his return to Paris, at the beginning of the year 1798, he forthwith collected an exhibition of native art-manufactures within the spacious house and grounds of the Maison d'Orsay, Rue de Varennes. It was to be expected that the specimens of manufacture he assembled would consist entirely of costly goods, inasmuch as manufactures of any excellence were not within the reach of the great body of the people. The master-pieces of manufacturing skill were, therefore, to be found exclusively in the palaces of the rich; and from these abodes of luxury he withdrew the gorgeous cabinet-work and marqueterie of Rilsoner and Boule; the clocks of Leroy; the gorgeous typograhical productions of De Thou and Grolier; Sèvres and Angoulême porcelain; the master-pieces of Vincent and David; the choicest fabrics of Lyons; and other costly products of the artist and the artizan. The exclusive character of the exhibition was the result, not of D'Avèze's wish, but of the condition of French society. He led the way which has been so faithfully and happily followed; he created in the hearts of the manufacturing population of France, that enthusiasm for their calling—that anxiety for the excellence of their national manufactures, which have since distinguished them. MM. Challamel and Burat have been guilty of a palpable injustice towards the Marquis d'Avèze, by remaining wholly silent upon the subject of his enlightened labours in the cause of art-manufacture, in their zeal on behalf of the accomplished De Neufchâteau. The year 1798 was a most favourable one for an exhibition of native industry. Napoleon had achieved his most brilliant actions in Italy, and brought the war to a successful termination; the spoils of war had been inaugurated with prodigal pomp, and it was happily suggested that the little collection in the Rue de Varennes should be copied on a grander scale. The government, bearing in mind the efforts of the Marquis d'Avèze at St. Cloud, and more lately in Paris, determined to erect a "Temple of Industry" on the Champ de Mars. Here the triumphs of war had been celebrated, and here it was resolved that the nursling of peace should receive a national ovation: the olive should be intertwined with the blood-bespattered laurel; Lenoir should not be forgotten in the glory of the defenders of the *batterie des hommes sans peur!*

Augustin Challamel, in his *Histoire-Musée de la République Française*, vouchsafes not a word to the Marquis d'Avèze; but declares at once, and without preface, that only two of the *fêtes* of 1798 are worth notice, from the impulse which they gave to the industry and art of the country, viz., that of the foundation of the republic, and that of liberty held on the 10th of August. At first, M. Challamel tells us, François de Neufchâteau put a very happy and useful idea into execution; but the writer dexterously refrains from naming the progenitor of the idea, upon which the accomplished minister acted. Under the superintendence of De Neufchâteau, M. Challamel continues, a fairy building was erected to the west of the national altar, containing long streets of stores and shops. This was the first national exhibition of French industry. By exciting emulation amongst native manufacturers, and appealing to their pride, they had been prevailed upon to send specimens of their wormanship from far and near. In the outset, this exhibition was called "a fair;" but the importance given to it by the universal encouragement with which its establishment was met, soon gave it the complexion of a thoroughly national undertaking. On the eve of the opening of the exhibition, François de Neufchâteau, attended by a jury, the civil dignitaries, and the learned of all denominations, held a meeting within the building, and delivered a speech, beginning in these terms:—"We are no longer in those unhappy times when enslaved industry trembled to bring forth the fruits of her skill and meditation; when galling

enactments, monopolising corporations, and fiscal burdens bowed down the inventive spirit; when art, become at once the instrument and the slave of despotism, helped to rivet the chains about the citizen, and owed success to flattery, corruption, and the humiliation of a shameful servitude." This picture of commercial bondage is more forcibly touched upon in Jules Burat's *Historical Essay*. He tells us, for instance, that a special royal enactment was necessary to secure to Lenoir, the celebrated mathematical instrument maker, the benefits of his skill. Monopolising corporations stood in the way of all inventors who did not belong to them. Thus, printed cottons and silks were so long kept out of France by the efforts of the corporations of silk and cotton manufacturers. Arin Argand's lamps are well known now throughout the world; but it may be interesting to note the fact, that his invention was well nigh destroyed, at first, by the corporations of iron-founders and locksmiths, because he was not a member of either of these societies.

Reveillon, who first introduced the art of painting paper into France, had to contend with the most vexatious impediments thrown in his way by the corporations of printers, engravers, and manufacturers of tapestry, and only escaped these persecutions by obtaining for his establishment the title of "Royal manufactory," a privilege which eventually led to its destruction, after the breaking out of the Revolution. When the privileges of corporations could not be brought to bear upon inventors, royal interests stood in the way. The most absurd and obnoxious monopolies were conceded to favourite subjects, regardless of the misery that might accrue to a class of the people from their enforcement; and these, coupled with the jealousies of corporations and the tyranny of the throne, made France, throughout the seventeenth and the greater part of the eighteenth century, an unfruitful, if not a dangerous abode for a man with inventive faculties. The instance of Fosse Van Rabais' privilege is notorious. It appears that this individual obtained, in 1665, an enactment from the king, which secured to him and his posterity the exclusive right of manufacturing cloth within an area of thirty leagues from Abbeville. M. Burat declares, that the effect of this monopoly was to retard the improvement of native cloth-workers for a considerable period. Another instance of the disastrous effects of such a system of monopoly may be instanced in the law which shielded the porcelain of Sèvres, to the detriment of other manufacturers, as well as to the disadvantage of the general public, who could not afford to pay the prices demanded for the protected manufacture. The monopoly gave a value to Sèvres china, and kept it within the reach of the wealthy only; but we have not learned that the potteries of Sèvres have deteriorated from having to compete with those of other places. That which was formerly the exclusive enjoyment of the rich, has become the luxury of the many. This cannot be doubted; and there are few, even in the present time, who will be sorry to behold such a result of free competition.

The "Temple of Industry," under the control of De Neufchâteau, remained open only during the three last complimentary days of the year VI. of the Republic (1798); but it sufficed to excite the greatest enthusiasm throughout the country. Those who managed this exhibition, in concert with M. de Neufchâteau, unanimously agreed that the safest principle to adopt for the award of prizes was to entrust the decisions on the merits of the competitors to a jury composed of a selection of the most distinguished available men in science and art. This system was adopted, and was found to work so well that it has been adhered to ever since. This first jury consisted of nine men only; namely, Chaptal, member of the Institute; Vien, painter; Motte, sculptor; Molard, member of the Society of Arts and Manufactures; Gillet Laumond, Commissioner of Mines; Duquesnoy, of the Agricultural Society; Ferdinand Berthoud, chronometer-maker; Gallois, a literary man; and Darcet, member of the Institute. There is no printed copy of the report which they made; but M. Julien Lemer, in his *Manuel de*

l'Exposant, gives a list of the principal manufacturers to whom prizes were awarded. They are as follows:—"M. Breguet, whose name is European, in connexion with the improvement of watch and clock-making; Lenoir, to whose skill as a mathematical instrument-maker we have alluded more particularly; Didot and Herham, who exercised so direct an influence upon the improvement of printing; Dilk and Guerhard, whose painted china rivalled the beauty of that of Desarnod, described as the French Rumford; Conté, whose name is familiar to every artist, and to whom we are indebted for the application of machine-ruling to engraving; Clouet and Payen, who directed a vast chemical manufactory; and Denys de Luat (Seine-et-Oise), who exhibited cottons spun to all degrees of fineness, from the most common to No. 110."

The second *fête* noticed by Augustin Challamel is that of Liberty. This festival appears to have been almost exclusively devoted to a national and sumptuous acknowledgment of the grand results of science and art; and the trophies, which were at once its chief ornament and the conspicuous disgrace of the country (the master-pieces filched from Italy), were raised aloft in the streets to the wondering gaze of thousands. The *cortège* was one of the most magnificent spectacles on record. As early as nine o'clock in the morning, the citizens who were to take part in the procession assembled along the left bank of the Seine, where the triumphal cars, loaded with trophies, were ranged. The procession was divided into three distinct divisions. At the head of the first a banner was borne, on which was inscribed, "Natural History." Foremost in this division the professors and administrators of the Museum walked, followed by the choice scholars, who marched by the side of the cars. The first car was loaded with various minerals, surmounted with this inscription:—"Every day art discovers herein new properties." The second car was full of petrifactions from Verona; and above these was written, "Monuments of the antiquity of the world." The third car contained the seeds of foreign vegetation, with the inscription:—"The palm, the banana," &c. The fourth car was crowned with living foreign plants, surmounted with these words: "They will increase our wealth and our pleasure." The fifth car was devoted to an African lion. The sixth, to a lioness. The seventh, to a lion from Sahara. The eighth, to a Swiss bear; and after these followed two dromedaries and two chamois. The ninth car was ornamented with agricultural implements from Italy, surmounted with this sentiment: "Ceres smiles at our trophies." The tenth car, which closed the first division, was loaded with two blocks of crystal, on which was inscribed, "The gift of the people of Valois to the French Republic." The banner which was borne at the head of the second division was thus inscribed:—"Books, Manuscripts, Medals, Music, and Oriental Type." "Science and Art are the support and ornament of Liberty." This banner was immediately followed by a chorus, singing patriotic melodies. Next came deputations from the scientific and literary societies; the principal actors from the theatres; the public librarians; the professors of the Polytechnic School; and, finally, the professors of the College of France, carrying a bust of Homer on an antique tripod, before which floated a banner thus inscribed:—"Seven cities disputed the honour of having given birth to him." Behind this bust followed professors of other learned societies, together with their most distinguished pupils. Then came six cars, covered with devices from Fontaine, Seneca, Delille, &c., which closed the second division. Upon the banner of the third and closing division, a sentiment from Lavallée was written:—"The arts seek those lands where the laurel flourishes." A choir of boys walked behind this banner singing appropriate snatches. Next came those pupils who had carried the last fine art prizes; and, after them, the custodians of the national galleries, the professors of painting, sculpture, and architecture, followed by their several classes; among whom a banner was carried, announcing "Specimens of the Sculpture of the Ancients." No less than twenty-nine

chariots laden with Italian spoils followed this banner. These desecrated trophies included the bronze gilt horses from the place of St. Marc, at Venice; the Nine Muses, Cupid and Psyche, the Venus (from the capitol), the Mercury de Belvidere, Venus and Adonis, the Egyptian Antinoüs and the Antinoüs de Belvidere, the Dying Gladiator, Trajan, Marcus Brutus, Ceres, the Apollo de Belvidere, and the Laocoön. Then followed a banner heralding the pictures, and thus inscribed:—"Flock hither, Artists; your Masters are here!" And what followed justified the gilded letters on the banner. Among other precious relics dragged through the streets on this occasion were Raphael's "Transfiguration," and the master-pieces of Domenichino, Romain, Titian, Paul Veronese, &c.; and these treasures were followed by the government authorities of Italy, decked with the tri-colour, and holding in their hand a crown of laurels. These closed this brilliant procession, which threaded the principal thoroughfares of Paris, and was at once a suggestive picture of the sagacity and insatiable greed of the conqueror. The method of its formation betrays what was passing in the mind of Napoleon at the time; and it is not unreasonable to trace the pacific and scientific character of this splendid day to the enlightened original idea of the Marquis D'Avèze, whose zealous efforts on behalf of the Gobelin and Sèvres workmen had attracted an unusual degree of attention, and could not have escaped the acute observation of Napoleon. It is right that the claims of the marquis should be fairly set beside those of his more pretentious rivals.

This first experiment was found to create such enthusiasm throughout the country, and to give such a healthy stimulus to native industry, by exciting an emulation of excellence among the manufacturers, that the government at once determined to repeat it annually. The nature of the prizes offered, or rather the regulations under which they were distributed, showed at once the undoubted superiority of English manufactures at the time to those of France, and the Gallic animosity existing towards this country. Government orders were addressed to the prefects of all the departments, directing them to form local committees empowered to decide upon the local products to be forwarded to the next exhibition. The prizes were to consist of twenty silver medals and one gold one, to be awarded to that competitor who should have opposed the most formidable rivalry to the looms of England. These directions were sent out by M. de Neufchâteau; but although, in this minister's circular, annual exhibitions were promised, the rapid current of public events, the wars, the fall of the Directory, and the establishment of the Consulate, retarded the opening of the second till 1801.

The time for this second exhibition was auspicious. The first consul, loaded with laurels from his wars, was wisely employed in cultivating and stimulating the arts of peace. He felt that his prosperity rested more in his sagacity and prudence in times of peace, than in his renown as a warrior. His splendid victories dazzled his adopted countrymen and flattered their pride; but he understood the French character too well to trust to that gratitude which was the mere echo of their flattered vanity. He therefore employed the leisure of temporary cessation of hostilities in paying visits to the workshops and great factories of Paris, Lyons, Rouen, Brussels, Liege, Aix-la-Chapelle, and Milan, in company with his illustrious and sagacious friends, Berthollet, Monge, and Chaptal (the framer of the report on the first exhibition). Everywhere he stimulated the manufactures by promises of the future, and by an anxious solicitude for their prosperity. Whether from selfish or purely patriotic motives, is a question of debate; but that Napoleon always acted sympathetically with the people at large, cannot be doubted. He attended to their requests, and respected their wants, and called the public market the "Louvre of the common people," therefore he re-built and enlarged it. He declared "the rabble" to be the only aristocracy on which he could depend in critical times; and his internal administration of affairs demonstrates the sincerity of this conviction

in his mind. He paid his acknowledgments to talent in a prompt and most complimentary manner. When he suddenly came across a man of rare abilities—as Ternaux, the founder of many fine factories—he would pluck the cross from his own breast, and decorate him in the presence of whoever might be in the way at the time. Instantaneous action was the secret of his power. He was as quick to execute as to resolve; he could not understand the word "hesitation." He had the faculty of seeing an entire question at a glance; and thus his rapidity of action seldom led him to commit errors of judgment. Instances of his judicial errors are rare; and, moreover, are so well repaired on the instant, that their evil effect is seldom palpable. During the commercial crisis under the Imperial sway, while irritated by the news of maritime reverses, he ordered all English goods found in the country to be burnt. This command raised a loud deprecatory clamour, and he at once saw the impolicy of which he had been guilty. The reparation he made was imperial—about twenty-one millions were advanced to the industrial community.

Upon the occasion of this great Exhibition, a quadrangle of the Louvre was used, and the greatest success attended the experiment. Similar expositions took place in 1802, 1806, 1819, 1823, 1827, 1834, 1839, 1844, and 1849. The last was esteemed the most splendid and successful of any hitherto held in Paris. It took place in a temporary palace erected in the Champs Elysées, which covered more than five acres of ground. There were 4,494 exhibitors, and the productions, ranged for the inspection of the curious, were considered as evidencing a decided advance on every thing of the like kind before exhibited.

In these last two expositions, an immense variety of raw material, machinery, and manufactures was exhibited. In every department an increase of taste was apparent; and cheapness of production seemed to have been an object of as earnest pursuit as those of quality and taste. Indeed, after these two expositions, France may well claim the high honour of having originated, cherished, and completely established National Industrial Exhibitions. It is true that other nations have partially followed her example; but no other people have given them so systematic and regular a basis as one of their established institutions. The Bavarian and the Belgian governments have, within the last few years, instituted Industrial Exhibitions, in imitation of those of France, and they have been attended with great success and popularity. In Spain, also, National Expositions of Industry have been held with more or less success. The first Spanish Industrial Bazaar was held in 1827, and had 297 exhibitors; the second in 1828, with 320 exhibitors; the third, in 1831, with 228 exhibitors; the fourth, in 1841, with 214 exhibitors; and the fifth, in 1845, when 325 exhibitors represented the genius, trade, and industry of Spanish manufacturers.

In our own country, during the last ten or fifteen years, there have been a great many local exhibitions of arts and manufactures, but they were all in the character of bazaars, to raise funds for particular objects, with the exception of the very limited exhibitions held by the Society of Arts in 1850. Manchester, Leeds, Birmingham, Dublin, and other towns have successfully held such bazaars, chiefly composed of the productions of the surrounding country; the one which most nearly approached the French Expositions, in the variety and extent of the national productions displayed, was the Great Free-trade Bazaar, held, for twelve days, in Covent-garden Theatre, in 1845, which not only was eminently successful as a bazaar, but excited the greatest public interest as an exhibition of our manufactures. From these displays, then, sprung the idea of the Great International Exhibition in Hyde-park. Of the French Exposition building, Mr. Digby Wyatt, in his report, says:—"The vast edifice which has been erected to contain the specimens of manufacture selected for exhibition in the year 1849 is situated on the same site as that occupied by a similar building in the year 1844. The Carré de Marigny, on which it has been placed, is a large oblong piece of ground, abutting on the main avenue of the

Champs Elyseés, and, as a site, offers every possible advantage, being of a gravelly soil, already efficiently drained, and standing on the line of a continually-moving series of public conveyances. The Champs Elyseés, though at some considerable distance from the great centre of Parisian population, are still so universal a place of resort, that they may be fairly assumed to be "in the way" of even the poorest classes of the community. The elevation may be admirably seen from all the approaches to the building, and it has the advantage of being in immediate proximity to the residence of the President of the Republic. The whole plot of the present building (exclusive of the agricultural department) covers a vast parallelogram of 206 metres by 100 (about 675 by 328 feet English , round the outline of which runs a gallery about 90 feet wide, divided into two avenues by a double range of pilasters. In the centre of each avenue is a set of stalls, placed back to back, for the exhibition of merchandise; and both between the central pilasters, and round, and upon the walls, other objects are placed; so that, on traversing either of the four gangways (each about ten feet wide) the public have upon their right and left hands objects for inspection. In the part of the building appropriated to large machinery, of course this system cannot be carried out with the same regularity. The vast parallelogram, enclosed by a somewhat similar gallery in the year 1844, was left as one magnificent hall, within which were placed the most important objects; in the present building we find it divided by two transverse galleries, similarly arranged to those we have described, forming three court-yards, the central one being about 140 feet square, and the two lateral ones 80 feet by 140 feet. The central court-yard is open to the sky; in the middle rises an elegant fountain, placed on a platform of turf, and around are disposed sheds for the exhibition of flowers and horticultural ornaments and implements. One of the lateral courts (enclosed) receives a large collection of objects in metal-work, cast-iron, &c., and the other contains an immense reservoir, in which all the drainage from the roofs is collected, so as to form a supply of water immediately serviceable in case of fire. In addition to this great building, which corresponds with that previously erected, there is this year constructed a vast shed, for the exhibition of agricultural produce and stock. It extends to a length rather greater than the width of the great parallelogram, and is about 100 feet (English) wide. Its construction is ruder than that of the 'Palace,' but it is not on that account less effective. It appears to have been originally contemplated to fill the whole of this gigantic hall with cattle, &c., and to place the agricultural implements in a large narrow gallery intervening between it and the main building; but as the stock of animals forwarded for exhibition has not proved so large as was anticipated, it has been half filled with semi-agricultural machines, and the whole of the long narrow gallery alluded to crammed with stoves, and miscellaneous domestic mechanism. The whole of the building is constructed of wood, the roofs being covered with zinc. Of the latter material 400,000 kilogrammes, equal to 4,000 tons, are stated to have been used; and of the former nearly 45,000 pieces of timber. The cost of this building is understood to have been about £18,000. Of the permanent building erected by the King of Bavaria at Munich, for periodical exhibitions, or even of Kroll's Winter Garden, since burned down, it is needless to dilate. It was 310 feet long by 82 broad, at the widest part. The building for the Birmingham Exposition of 1849—the first in this country, really so called—covered a space of 10,000 square feet, and a corridor of 800 feet more, connected the temporary building with Bingley-house, within the grounds of which the Exhibition took place. It was open to the public in September, 1849, at a cost of £1,300.

CHAPTER XXXIII.

TELESCOPES, ORRERIES, GLOBES, AND MODEL MAPPING.—*From the Juries' Report.*

TELESCOPES—VARLEY AND SON—ROSS—CALLAGHAN, ETC.—BURON—KINZELBACH—ORRERIES—FACEY—PLANT—PLANETARIUMS—NEWTON AND SON—LE FEUVRE, BRAKE, ETC.—RICHARD'S GEOGRAPHICAL INSTRUCTOR—DETOUCHE AND HOUDIN'S URANOGRAPHIC APPARATUS—GLOBES—JOHNSTON—NEWTON AND SON—FLETCHER, REDHOUSE, ADORNO, ETC.—MODEL MAPPING—SCHOELL—IBBETSON, ETC.

The telescope is an instrument of such high importance, that it ought to command at all times, from opticians, the incessant direction of their attention to its improvement, and the bringing it to the highest possible state of perfection. In the Exhibition, if we except those affixed to astronomical instruments, there were but few telescopes. Of those the larger were for the most part good. Wray exhibited one with discs of a solid substance, instead of flint glass, which deserved commendation, as a deviation from the beaten path, that may conduce to new and important results. There were few samples in the Exhibition of optical glass; but all were good, and gave great promise of an increase in the use of large telescopes. Simms exhibited several object-glasses made of English glass; and Chance contributed a noble piece of apparently pure flint glass, of no less than twenty-nine inches in diameter. Daquet sent some wonderfully pure glass, both crown and flint. Of lenses and prisms, there was not one British contributor; France stood alone in the exhibition of some very beautiful work, which reflected high credit upon Bayerle and Bertaud. Of physical optics, there was but one extensive exhibitor, viz., Duboscq Soleil, France, who had a beautiful collection of most delicately constructed instruments, adapted for physical investigation. Of microscopes there were a good many exhibited; among which the English microscopes were found to stand pre-eminent.

Telescopes.—Varley and Son exhibited an apparatus to be used in Gregorian telescopes, consisting of three small speculums, grouped together on one stem, and fitted into a telescope, under adjustment from the eye-end, by means of which any one of the three might be used at pleasure, so that the power may be changed without losing sight of the object. Within the tube were placed two slides, one near the eye-end, adjustable by a screw; the other near the object-end, which might be moved to and fro. The latter carried three small speculums, of different foci, mounted on a steel axis, held in a stiff frame. At the bottom of the axis was placed a toothed wheel and rack-work. This rack was kept from moving by a long bar proceeding from the first slide, so that it could not move with the slide on which it laid; by this arrangement, on moving the slide, the wheel upon it rolled against the rack, and so presented the next speculum. The angles at which the speculums are opposed to each other on the block determines the number of teeth, or portions of the circle required to present each speculum. The diameter of the wheel determines the distance that such portion of the wheel must traverse to put each speculum in true focus. The slide nearest to the eye-end is moved by a long bar, attached to it by means of a screw, whilst its near end lies on the other slide, and over the loop-hole. The bar has a screw handle on the outside of the telescope, by which to pull or push the further slide, and also to clamp it fast to the near side when in the right place. This clamping connects the two slides, and causes both to obey the adjusting screw. In order to determine the exact places at which to clamp, the bar is furnished with three notches, whose distance corresponds with the

difference of foci; a tooth snaps into each notch as it arrives; the hand of the observer feels this snap, and the object reappears at the same instant the screw is made fast. Having brought each speculum to its right distance, its perfect position is effected without trouble. The speculum wheel has three pins; against one of these a notch in the bar is urged by a spring, which holds its corresponding speculum perfectly in place, and in addition, moves the wheel and rack a little further than the hand and bar had formerly done. This simple action separates the two hooks, and thereby detaches the apparatus from each speculum whilst it is in use, leaving it at liberty to be governed only by its pin, and the notch in the bar already mentioned; the speculum by these means is held perfectly in its place. A cylindrical cap, as a protection from the weather, is made to slide over the speculums, and affords a dark margin round the pencils of light. This contrivance has been applied to telescopes of eight inches focal length, and six inches aperture. The Gregorian form of telescope is the shortest, and consequently best supported on the stand; and possesses many advantages, as compared with others of equal power; from its large proportionate aperture, it gives a smaller disc to the stars, and does not require a deep eye-piece, but it is desirable to obtain power by deeper and smaller speculums.

Varley and Son also exhibited a portable Gregorian telescope, of two inches aperture, and six inches focus. It was mounted on a brass stand, and admitted of being readily packed away in a small box. When held against a post or tree, the foot and telescope formed a firm triangular bearing. Ross exhibited a telescope of three feet focal length, and two and-a-half inches aperture, of English flint glass, which, examined on test objects at 150 yards, was found to perform well. A council medal was awarded to Mr. Ross for this telescope, in connection with microscopes. Callaghan exhibited a telescope intended for use in deer-stalking. Salmon exhibited several day and night telescopes, intended for ships' use, which were good for their price. Richardson, Boyle, Wray, and others also exhibited a variety of telescopes of different degrees of merit. Buron, of France, exhibited a telescope, the object-glass of which was of rock crystal, four feet two inches in diameter, and six feet three inches in focal length. Attached to the telescope was a finder, which embraced a field of view from 5° to 6°, and had cross wires, which owing to the great illumination of the field, might be seen during the darkest night, and consequently brought the star into the centre of the field. On examining this instrument it was found to be perfect in every respect. It was fixed upon a very steady cast-iron stand, furnished with three small castors, brought into operation by means of rack-work, when necessary to remove the instrument. M. Buron also exhibited another telescope of about the same dimensions, which was found to be good, and also many telescopes of various sizes. Many of the portable ones were tried, and their performance was found to be very good; they were at the same time remarkably cheap. A council medal was awarded to M. Buron. Lebrun also exhibited several good, and remarkably cheap, achromatic telescopes. Kinzelbach, of Wurtemburg, exhibited an achromatic telescope of about two and-a-half inches aperture, and twenty-three and-a-half inches focus, constructed on the dialytic principle, in which the correction of the dispersion of the crown lens was performed by a flint lens of only half the aperture, placed midway between the crown lens and the joint focus; a principle of compensation originating theoretically, we believe, with the late Mr. Rogers, of Leith, and carried into practice with much success by Plössal. This instrument was found to give very perfect images, with no uncorrected colour; this, together with its being the only telescope of the kind exhibited, and the construction deserving of encouragement, induced the jury to consider it worthy of a prize medal. Busch, of Prussia, received honourable mention for a variety of useful telescopes.

From telescopes we naturally turn to orreries, planetariums, and astronomical machines.

It was a matter of regret to the jury that the time and ingenuity which were devoted to the several machines of this class in the Exhibition, had not been better directed. Those exhibited did not indicate any improvement over the many which had been constructed—one only, perhaps, excepted, viz., a vertical orrery of large dimensions, made by a working man, after his own design, and it is understood, without ever having seen an orrery of any kind. The time, ingenuity, and expense, devoted to machines of this kind are wasted; they are of no use to the student of astronony, and the erroneous impressions which they give are always displeasing to the eye of the astronomer. Facey's vertical orrery, however, is the best adapted for the lecture-room of any that has hitherto been constructed. As it has been already described in a preceding chapter, we shall merely observe that the jury very properly awarded to the inventor a prize medal. Plant also exhibited an orrery which deserves mention. The sun was represented in it by a luminous body, and the seasons, phases of the moon, and other natural occurrences were clearly shown. It would be used to the greatest advantage in a darkened room, when the sun of the orrery would best show the various changes attendant upon the different motions of the several bodies.

Newton and Son exhibited a planetarium for educational purposes, intended to show the diurnal and annual motion of the earth and moon, also the respective position of their satellites. It was exhibited for cheapness. Le Feuvre also exhibited a useful orrery for schools; and Masset, of Switzerland, received honourable mention for an extremely useful, simple, and cheap planetarium. Brake exhibited the model of an instrument called a Periphan, which readily showed the time of the sun rising and setting at any place exterior to the frigid zones, and various other phenomena of an analogous nature. Matthews exhibited an astrorama. This was a concave representation of the heavens upon a small umbrella, which opened and closed at pleasure. The material with which it was covered was perforated to show the places of the larger stars. Richards exhibited a "geographical instructor," a piece of mechanism in which the sun (represented by a gilt ball elevated on a wire) was presented vertically, to every point of the earth between the tropics, by a compound movement to and fro, corresponding in extent to the time of the sun's declination at the moment. The law of this movement was given by a train of clock-work, of which one peculiarity was the prolongation of the axis of the globe into a very long pinion, so as to allow the teeth of the driving-wheel to act upon it, however far displaced from a mean position. Another—that of the communication of the rotary motion from the *primum mobile* by a hook-jointed axis—the to-and-fro motion of the pinion prolongation of the axis not allowing the clock-work to be centrically placed in some point in that direction. Detouche and Houdin (France) exhibited a uranographic apparatus (erroneously described in the catalogue as a monographic apparatus); it consisted of a table about six feet in diameter, in the centre of which was a lamp representing the sun. The earth, with the moon attached, was carried round on an arm, by a piece of clock-work, the *primum mobile* of which was not a spring or any internal power, but the roller on which the mechanism rested, and which revolved as the earth was carried round on the table. This, by a train of wheel-work, communicated to the earth its diurnal motion, preserved the parallelism of its axis, and gave to the moon all the movements imitative of real ones. This mechanism was the invention of M. Guénal.

Globes—A. K. Johnston, exhibited a terrestrial globe, thirty inches in diameter; it showed the geological structure of the earth, indicated the currents of the air, trade-winds, monsoons, &c.; also the currents of the ocean, trade routes, and isothermal lines, or lines of equal temperature. The stand, which was executed by N. Davidson, of Edinburgh, was carved in walnut, and was of elaborate and elegant design. A prize

medal was awarded by the jury for this globe. Newton and Son exhibited a large manuscript celestial globe, six feet in diameter. The positions of the stars were laid down from their positions as calculated for the year 1860. A variety of other different-sized globes were also exhibited by Messrs. Newton, which were distinguished by good finish generally, and by cheapness. A prize medal was awarded to them by the jury. Fletcher exhibited a pair of terrestrial globes, which were well made and finished; and one case, showing the various stages of globe-making, which was interesting. Redhouse exhibited a model of the moon in high relief, the craters, mountains, &c., being modelled from actual observation, with a one-foot reflector, power about fifty-five, and the occasional use of a refractor, power ninety, (the use of the latter being procured only at the expense of a journey of thirty-five miles). We were reminded, by the sight of this interesting object, of those beautiful lines in Milton, wherein he describes the "ponderous shield" of the fallen archangel, likening it to

> "The moon whose orb
> Through optic glass the Tuscan artist views
> At evening from the top of Fesolé,
> Or in Valdarno, to descry new lands,
> Rivers, or mountains in her spotty globe."—*Paradise Lost*, Book I.

The jury, however, although they bestowed their commendation upon this globe, were of opinion that the scale of height had been pitched too high; and that the effect was injured rather than improved by silvering or gilding portions of the surface, the whole being composed of a dark material. Adorno exhibited a globe twenty-five inches in diameter, with the celestial and terrestrial maps super-imposed one upon the other; also a globe of papier-maché, divided into forty-eight pieces, to be taken to pieces and rebuilt at pleasure; and a skeleton globe, to show how to rebuild the globe in its frame. The power of taking the globe to pieces was convenient for package and removal, as well as for the convenient study of any part of it. They were well made. Stoker exhibited an angular terrestrial globe, in tended for the solution of geographical problems. It is adapted for use as a common terrestrial globe, by unscrewing the cog-wheel attached to the spindle at the south pole, and substituting the horizon and meridian, the former being screwed in the upright of the stand, the latter being placed upon the globe, the angular motion given to which is designed for the better explanation of the changes of the seasons. Mr. Stoker also exhibited a spherical geographical clock, to show the difference of time between two given places whose longitudes are known, and intended to be of more general use than those ordinarily constructed. Bentley exhibited a plain globe. The northern and southern hemispheres were printed on circular pieces of card-board, each hemisphere moving under a brass meridian, which confined it to its place, and afforded the same facility as an ordinary globe for working problems. Paxon exhibited a lunarium, with a contrivance for showing the phases of the moon. Marratt exhibited a Russell's globe of the moon, mounted as originally sold, with movement in brass, for exhibiting the vibrations, &c., in longitude and latitude. Good exhibited a new method of illustrating the effect of the earth's diurnal motion upon the plane of a pendulum's oscillation. It consisted of one end of a radius arm, fixed in the centre of a globe; the other end being adjustable in a vertical plane, and therefore to any latitude, was made to revolve so that its time of revolution varied as the sine of latitude; the time of the revolution of the globe being its measure. Gilbert exhibited a portable celestial and terrestrial globe, made of tissue-paper, and inflated with air. The celestial globe was adapted chiefly for the use of the lecture-room, and might be made of any convenient size. The terrestrial was twelve feet in circumference, and was inflated either by means of an air-pump, or by simply raising it to and fro from the floor, by which means it might be

effectually filled in a few moments. These globes may be folded into a very small compass.

Kummer, of Prussia, exhibited a terrestrial globe in relief, four feet in diameter. The execution was excellent; not only were the elevations attended to with great care, but also highlands of moderate elevation, and the courses of rivers, received the same degree of attention. A prize medal was voted by the jury to M. Kummer for this globe. Goodyear, of the United States, exhibited inflated globes two feet in diameter, of India-rubber or silk, varnished with the former material—also India-rubber maps. Grosselin (France) exhibited georamas and uranoramas to be used as lamp-shades; also some very good and distinct celestial globes, in which the figures and constellation boundaries were neatly and prettily laid down, so as not to confine the representation of the stars. Ziebermayer (of Austria) exhibited a small terrestrial globe, enclosed in a glass sphere, on which the celestial spheres and stars were traced. By means of mechanism, the places of the sun and moon among the stars were shown. Reidl, of Austria, exhibited a small globe of the moon, about ten inches in diameter; the engraving was of a sepia colour, somewhat faintly tinted, and of a seleno-topographical rather than a pictorial character. Some of the principal names were inserted. It was mounted on a brass pillar, with a horizontal circle, showing lunar longitudes, and a vertical one for latitudes; the lunar axis was vertical.

Relief, or Model Mapping.—Denton exhibited specimens of model or relief mapping, in its various stages, with all the tools necessary for use. The base of the model exhibited was of slate, a material which may be procured of sufficient thickness to bear any weight in a horizontal position, may be ground sufficiently thin for framing, and may also be worked to the smoothest possible surface: thus containing the qualities necessary for the work in question, the use and accuracy of which are dependent upon the material upon which the superstructure is raised. To represent the altitudes depicted in the contour map, a simple mechanical process is adopted; slips or ribbons of thin copper, cut parallel, of different breadths and of any length, are prepared. Each breadth represents a contour, and is proportioned to a certain elevation: after careful measurement with the altitudes which they are intended to represent they are each adjusted and secured in their true position. The model so prepared is ready for covering with plaster of Paris, a substance well suited to give a finished appearance to the work. After the plaster is dry, the whole should be scratched down until the light edge of each copper ribbon peeps to the surface. The model is thus prepared for the reception of the oil colours intended to trace upon it the geographical details of the country. The jury awarded a prize medal to Mr. Denton. Schoell (Switzerland) exhibited a model in relief of Mount Sentis, and the mountainous regions about Appenzell, including a surface of about 150 square miles. It was executed with great spirit and distinctness, and was accompanied by a chart on a smaller scale of the same region (scale 1 to 25,000), containing the data for its construction, consisting of a minutely elaborate series of contour or level lines, which covers the whole area, and is carried into every detail. The merit of the execution was enhanced by the plastic material of the model, as well as the apparatus used in its construction, being of the artist's own invention. This work was considered by the jury to merit a prize medal.

Ibbetson exhibited an exceedingly well-executed relief model of the Isle of Wight, on a scale of three feet to one mile, the elevation being on the same scale. The geographical and geological features of the country were carefully delineated. A prize medal was awarded to captain Ibbetson. We cannot dismiss the subject of model mapping without a few words on its beauty, utility, and agreeableness. How pleasant must it be to retrace among the miniature mountains and valleys our former wanderings, or, if yet "untravelled," to anticipate, with all the freshness of youth, a first exploring of the fairy precincts, so elaborately and so correctly laid down. With such a map before us we

may climb the Jura, dip into the pastoral valleys of Switzerland, and ascend, without fear of disappointment from clouds or tempest, the loftiest summit of Mont Blanc; sail upon the peaceful lakes, and rove among the vineyards of the south; pass over into classic Italy, and wend our way to the Eternal City, without apprehension of extortionate douaniers, fleecing landlords, or ruthless brigands. We may trust ourselves upon the bay of Naples, even in its stormiest mood—for that *pezzo di cielo* is not always exempt from trouble—visit its azure grotto, mount up to Vesuvius, peep into its fearful abyss, and, in our way down, tread over the ruins of Pompeii and Herculaneum, although we enter not the subterranean cities. But we must pause in our career, or our readers may complain of the distance and difficulty of return. One word to those who have extensive libraries:—none of them can be considered as complete without a good assortment of Model or Relief Maps.

CHAPTER XXXIV.

PIPES AND AMBER MANUFACTURES.

TOBACCO—DR. JOHNSON—LORD BYRON—DIFFERENT KINDS OF PIPES—MEERSCHAUM—AMBER—METHOD OF OBTAINING—VARIETIES OF—PIPES—GERMANY—BRITISH COLONIES—PRIMITIVE PIPES OF INDIA—CHINA—FRANCE—TURKEY, &c. &c.—SNUFF-BOXES—POUNCET-BOX—SCOTCH MULL—CUMNOCK BOXES—AUSTRIAN, CHINESE, AND INDIAN BOXES, &c.

"Boy, bring an ounce of Freeman's best."

Such was the exclamation of Dr. Jonathan Swift, in the days of "good Queen Anne," when the use of the "Indian weed" was universal in our island, when the poet and the philosopher alike owned its inspiration, and when the clergy, the quorum, and the squirearchy vied with each other in their devotion to the pipe and the bowl. Dr. Johnson, however, observes, that there was less drinking in his time than there was among our ancestors, owing to the change from ale to wine. "I remember," says he, "when all *decent* people in Lichfield got drunk every night and were not the worse thought of. Smoking has gone out. To be sure, it is a shocking thing, blowing smoke out of our mouths into other people's mouths, eyes, and noses, and having the same thing done to us. Yet I cannot account, why a thing which requires so little exertion, and yet preserves the mind from total vacuity, should have gone out." Had the worthy doctor lived to the present time he would have seen the custom very generally renewed among all classes of the people. The poor as well as the rich, the young as well as the old, have adopted the practice of smoking; and although it has been denounced by the hygeist, as well as by the sterner moralist, it is still unchecked among us, "*viresque acquirit eundo.*" Nay, some of our most esteemed poets have been lavish in their praises of the soothing intoxication—witness the testimony of the noble bard, whose muse, we regret to say, is not always on the side of decent propriety; however eloquently he may advocate the habit, to which he himself was so strongly addicted. We quote the well-known lines from his poem of the *Corsair*:—

"But here the herald of the self-same mouth
Came breathing o'er the aromatic south,
Not like a "bed of violets" on the gale,
But such as wafts its cloud o'er grog or ale,
Borne from a short frail pipe, which yet had blown
Its gentle odours over either zone,

And, puff'd where'er winds rise or waters roll,
Had wafted smoke from Portsmouth to the Pole,
Opposed its vapour as the lightning flash'd,
And reek'd, midst mountain-billows unabash'd,
To Eolus a constant sacrifice,
Through every change of all the varying skies.
And what was he who bore it?—I may err,
But deem him sailor or philosopher.
Sublime tobacco! which from east to west
Cheers the tar's labour or the Turkman's rest;
Which on the Moslem's ottoman divides
His hours, and rivals opium and his brides;
Magnificent in Stamboul, but less grand,
Though not less lov'd, in Wapping or the Strand;
Divine in hookas, glorious in a pipe,
When tipp'd with amber ——."—*Byron.*

Leaving, however, the more serious discussion of this subject to abler pens, let us see what were the appliances and means displayed in the Great Exhibition towards the enjoyment of such recreation as is afforded in the use of the much-esteemed production of tobacco. Of the raw and manufactured article itself there was an abundant supply. Tobacco, cigars, cheroots, and snuffs were sent in great quantities from all parts of the world, and to several of the exhibitors prize medals were awarded. Before we discuss the merits of the pipes contributed from almost every quarter of the globe, we will notice the materials chiefly employed in their manufacture. These are clays of different kinds, woods of several descriptions, mother-of-pearl, horn, ivory, and bone; but the names euphonious to the ear of the genuine smoker are amber and meerschaum. The latter substance is devoted entirely to his use; and the former, though not entirely his own, pays to him a very considerable tribute, in the form of mouth-pieces. The genuine meerschaum was held in high estimation in England, as early as the year 1609; since Dekker appears to refer to it in his *Gull's Horn-book*, when he wishes his gallant to be able to discourse "which pipe has the best bore, and *which burns black*, and which breaks in the burning." Meerschaum is a mineral of somewhat rare occurrence. It consists of magnesia, silica, and water, and may be called a hydrated silicate of magnesia. Its colour when pure is quite white, but it is frequently combined with silicates of iron and alumina, which give it a yellow or brown colour. It is met with in various localities, in Spain, Greece, and Moravia; but by far the largest quantity is derived from Asia Minor, it being chiefly dug in the peninsula of Natolia, near the town of Coniah. Formerly, the material was roughly fashioned on the spot into bowls, which were more elegantly carved in Europe. The art was especially cultivated in Pesth and Vienna, where it formed an extensive and important branch of trade. These rough bowls still occur in commerce; but by far the greater part of the meerschaum is exported in the shape of irregular blocks with obtuse angles and edges, requiring careful manipulation with the aid of water, in order to remove irregularities and faulty portions.

Previous to the mechanical treatment of the meerschaum for making the bowl, it is subjected to a certain preparation. It is soaked in a liquified ungent composed of wax, oil, and fats. The wax and fats which the substance absorbs, cause the colours which meerschaum assumes after smoking. Under the influence of the heat produced by the burning tobacco, the wax and fats pass through all the stages of a true process of dry distillation, the substances thus formed become associated with the products of the distillation of the tobacco, and by their diffusion through the meerschaum, all those gradations of colour which are so highly prized by the connoisseur are produced. The large quantity of meerschaum parings that are left in roughing out the bowls would

entail considerable loss, unless some process had been devised of rendering them available. A species of meerschaum bowl has long been known in commerce under the name of *Massakopfe*, which is made from the parings; these are triturated to a fine powder, boiled in water, and moulded into blocks, with or without the addition of clay. Several specimens of composition pipe-bowls and cigar-tubes were exhibited in the Austrian section. These bowls are distinguished from real meerschaum by their greater specific gravity, and their freedom from those little blemishes which result from the presence of foreign bodies in the natural meerschaum.

Amber.—The most extensive use of this elegant material is for the manufacture of the mouth-piece, an essential constituent of the genuine meerschaum and Turkish pipe. Up to the present day, amber mouth-pieces continue in great request in the East, where they fetch very high prices, instances of which will be quoted. There is a current belief in Turkey that amber is incapable of transmitting infection, and as it is a great mark of politeness to offer the dipe to a stranger, this supposed negative property of the amber accounts, in some measure, for the estimation in which it is held. In the Christian countries of Europe, ivory, bone, and horn, have, to some extent, usurped the place of the more costly material, which is reserved for the higher class of pipes. Amber is also much employed in numerous small fancy articles, especially for beads, broaches, necklaces, and ear-rings. The Exhibition furnished also examples of its being worked occasionally into candlesticks, salvers, pipe-tubes, and other larger articles. The coarser descriptions and chips of amber are also employed for the manufacture of varnish, and the preparation of amber-oil and succinic acid, which it yields by distillation at a moderate temperature.

The mode of obtaining amber is peculiarly interesting. The greater part is found on the coast of Prussia Proper, especially between Konigsburg and Dantzic; it is distinguished as terrestrial and marine amber; the former is dug in mines, and is generally found in alluvial deposits of sand and clay, associated with fossil wood, iron pyrites, and alum shale. Amber is also found in some other countries, but never to any amount. The marine amber is cast ashore during the autumnal storms on the coast of Pomerania and Prussia Proper. It is then picked up, or fished for with small nets. There were several fine specimens of both descriptions of amber in the Austrian section and in the Prussian section. The opinions respecting the origin of amber are very divided; some hold the view expressed by Tacitus, in his *Germania*, that it is a resin exuded by certain coniferæ, traces of which are frequently observed among the amber. Others assume it to be a species of wax or fat, having undergone a slow process of putrefaction; and they base their views upon the fact, that chemists are able to convert cerous or fatty substances into succinic acid by inducing oxidation artificially. It is quite certain that at one time amber must have been liquid, for numerous small animals are found enclosed within it; these, for the most part, are insects belonging to an extinct species of *Arachnidæ*. There were numerous and excellent specimens of amber enclosing insects in the Prussian section, and others in a case, which obtained favourable mention, from D. T. Tessler, who sent a specimen containing the leg of a toad. Our readers may probably remember the lines of Pope on this subject:—

> "Pretty, in amber to observe the forms
> Of beetles, butterflies, or grubs, or worms;
> The things we know are neither rich nor rare,
> But wonder how the devil they got there."

The process which nature thus employs for the preservation of the structure of extinct insects, is one which the microscopist successfully imitates by embalming his delicate dissections in Canada balsam between two slips of glass.

There is evidence of the extreme antiquity of amber in the fact, that the Phœnicians of old fetched it from Prussia. Since that period it has been obtained there uninterruptedly, and no diminution in the quantity annually collected has been perceived. The different kinds of amber are distinguished by varieties of colour and degrees of transparency. It is found of all shades of yellow, from the palest primrose to the deepest orange, or even brown. In point of clearness, amber varies from vitreous transparency to perfect opacity, specimens being obtained nearly as white as ivory. It is, however, rarely found in this state, and is chiefly used for cameo ornaments, and is mounted on darker amber, which forms the back ground. Several examples of its employment were exhibited in the Prussian section. Of the different varieties of amber, the straw-yellow, slightly cloudy, translucent specimen is the most rare, and is preferred by the orientals to all others, and is purchased by them at extravagant prices. There were but few specimens of it in the Exhibition. Amber, as is well known, possesses the property of attracting, when rubbed, light substances, such as straws, which was the first electric phenomenon ever observed. Having made these general observations on the character of amber, let us examine what was presented to us in the Great Exhibition under the heads of Pipes and Amber Manufactures.

Germany.

"No one will be surprised," it was observed, in the Reports of the Jury, "that this land of smokers bore off the palm in the manufacture of pipes and amber; nor that her exhibitors outnumbered those of all other nations collectively." We have ourselves observed, wherever the German language is spoken, the use of the pipe to be universal; all of every rank and age indulge in the dreamy luxury—every roof is redolent of smoke; at all hours, and in all situations the pipe is available. "From morn to noon, from noon to dewy eve," the practice continues; the clerk over his ledger—the artist beside his easil—the student and the listless lounger—the prince and the noble, alike participate in the soothing intoxication; even the labourer in the field cannot plough, or sow, or reap without the pipe depending from his lips; while the soldier and the sailor claim a double allowance of the infatuating weed, and chew as well as smoke. *Mais revenons a nos moutons.* All the states of Germany, however, did not contribute equally, the pipes being chiefly from Austria, and especially from Vienna, and the amber manufactures from Prussia. The meerschaum works of the Viennese were unrivalled, as regarded taste in design and excellence in execution; the carving of many of the pipe-bowls and cigar-tubes being examples of highly-cultivated art. Most of the fancy pipe-tubes, composed of horn and mother-of-pearl, were more curious than graceful; the cherry-tree tubes were in great variety, and were good examples of this component of the long pipe; besides these, there were large numbers of bone and wood mouth-pieces, and others made of amber, the latter being beautifully worked. The meerschaum-pipes from Prussia were not numerous, nor were they so elaborate as those of Austria. The Prussian section presented such a series of amber specimens which are not likely to be again collected; the manufactured amber did not, however, evince much feeling for artistic design on the part of the exhibitors, whose merits rested principally on the excellence and difficulties of the workmanship. The contributions from the other parts of Germany consisted of meerschaum and other pipes from *Bavaria,* which were not remarkable; porcelain pipes from *Hamburg,* and clay pipes from *Nassau.* Those from Hamburg were of fancy forms, and those from Nassau were chiefly plain, which were sold at exceedingly low prices.

BRITISH COLONIES.

British Guiana.—T. G. Duggin sent a specimen of a pipe, or rather tube, used by the aborigines for smoking tobacco, called a *winna;* it resembled a cheroot in outward appearance, but was hollow, so as to contain the tobacco. It is said to be made from the rind of the fruit of the manicole-palm, from the river Berbice. It may be remarked that such tubes, made of paper covered with the leaf of tobacco, are now manufactured in England. *Canada* contributed a collection of well-made clay-pipes. The *Indian* collection contained examples of the costly and beautifully-ornamented cocoa-nut and lac Hookahs, mounted in silver, with their rich tubes or snakes, and the simple pipe composed of two pieces of bamboo, one for the bowl, cut close to a knot, and a smaller one for the tube. These primitive pipes are in common use amongst the poorer natives of India, and yet Dr. Royle cites an extemporary pipe sometimes used by the natives, which surpasses even this in simplicity; the amateur makes two holes, one longer than the other, with a piece of stick in a clay soil, inclining the stick so that they may meet; into the shorter hole he places the tobacco, and applies his mouth to the other, and thus luxuriates in the fumes of the narcotic herb. There was, likewise, a specimen of the Singoo opium-pipe, which is of very small dimensions, the tube not being larger than a thimble. The opium is placed in the bowl, and ignited by placing a piece of charcoal on it, which is effected with a small pair of tweezers, which found a place in the interesting and well-arranged collection.

CHINA.

The habit of smoking is very general in China, being common to both sexes in all classes of society, and at all ages. In every part of this vast empire the tobacco plant is cultivated, and consumed both as snuff and for smoking. So prevalent is the habit, that little girls and boys are commonly seen smoking, and from this early period, it is persevered in by its votaries through life. It is always customary to offer visitors a cup of tea and a pipe. M. Natalis Rondot estimates the number of smokers in China as at least one hundred millions, and states that pipes are made in enormous numbers, and in an almost infinitive variety of forms; they were of three classes, the water- pipe, the straight-pipe, and the opium-pipe. These Chinese pipes are generally very long, and the bowl very small, it being usually made of nickel-copper. The only contribution, however, was from Dr. Berncastle, who sent an opium-pipe and appurtenances.

FRANCE.

The examples consisted of clay-pipes only, from two exhibitors; they were very numerous, and exceedingly well manufactured, but their forms were not such as to sustain that high reputation for graceful design which this country enjoys. This is to be attributed to the class of persons for whom the pipes were intended, and who prefer a pipe-bowl moulded into the form of some grotesque head, with staring eyes, to the most elegant figures which could be devised. Very large quantities of these pipes are exported to England, Germany, Italy, the United States, and other countries, and are much esteemed on account of the very excellent quality of the earthenware of which they are formed. Their superior texture, it appears, is due in some measure to the clay of which they are chiefly composed, but principally to the great skill of the manufacturers in compounding it with other materials. To give some idea of the extent of the pipe-manufacture at St. Omer, it may be stated that one of the exhibiting manufactories—that of Dumeril, Sons and Co., employs 450 work-people, and produces annually 100,000 gross, or nearly fifteen million pipes, varying in price from one penny per

dozen to threepence each; and that the other—that of L. Fiolet, employs 850 work-people, and produces 200,000 gross, or nearly thirty millions of pipes, consuming 7,874 tons of clay in their manufacture.

In the Turkish collection were numerous rich examples of the *Narguilé*, or water-pipe, in some cases composed of silver, and ornamented with precious stones; the flexible tube, or *Marpitch*, used with the Narguilé, is formed with a spiral wire covered with leather, over which another wire is coiled, so as to fall between the interstices of the inner spiral. The Turks, in smoking the Narguilé, inhale the fumes into the lungs, and never consume the last portions of tobacco, as the smoke becomes too pungent. There were numerous examples of the long-pipe, or *Kablioun*, and the short-pipe, or *Chiboque*, with the cherry-tree, jasmine, wild-plum, and ebony tubes; and likewise the crude gimblets, with which these tubes, five feet or more in length, are bored. In boring the tube, the Turk places it above the gimblet, and thus gets quit of the chips; after boring the hole half-way, he meets it from the other end of the stick. The wild cherry-tree, which is principally used, seldom occurs free from defects in the bark, to repair which, so that the reparation cannot be discovered, is the chief difficulty. There were examples of *Lules*, or pipe-bowls, used with these tubes—they are composed of the red-clay of Nish, mixed with the white earth of Roustchouck. They were very graceful in form, and were in some cases ornamented with gilding, but as the Turk prefers a fresh bowl each time, the plain ones are chiefly employed on the score of economy. It is not unusual in Turkey to compute distances, or rather the duration of a journey, by the number of pipes which might be smoked in the time necessary to accomplish it. The *Imanes*, or amber mouth-pieces, exhibited in the Turkish section, surpass those of any other in splendour. One exhibitor sent four of choice amber, which were worth together, £1,000; besides these, there were three groups from distinct exhibitors; in the case of one was noticed an amber cigar-tube, which is one of numerous instances of the innovations upon Turkish customs by the introduction of European ideas.

There were also specimens of pipes exhibited from Egypt, Persia, Sardinia, Tunis, Tuscany, and the United Kingdom, many of which were deserving of commendation. The number of exhibitors of pipes and amber was forty-nine, of whom ten were holders of a prize medal, and eighteen obtained honourable mention.

Snuff-boxes.—From the tobacco-pipe to the snuff-box, the transition is easy. "The word 'snuff,'" says the *Jury Reports*, from which we extract these remarks, "is an inflexion of the old northern verb *sniff*; and it existed as a term of strong inhalation through the nostrils, or of angry impatience, long before the invention of the substance to which it now gives a name. Out of the latter signification, was the colloquial expression of the sixteenth and seventeenth centuries, to 'snuff pepper,' or to take 'in snuff.' It will be remembered that this last phrase occurs in Shakspere's *Henry IV.*, in immediate connection with a small box containing perfume, as displayed by the courtier who enraged Hotspur:—

> 'He was perfumed like a milliner;
> And, 'twixt his finger and his thumb, he held
> A pouncet-box, which ever and anon
> He gave his nose, and took't away again;
> Who, therewith angry, when it next came there
> Took it in snuff.'

From the pouncet-box the perfumes, whether moist or dry, were inhaled into the nostrils; but it was probably not until a century after the general encouragement of tobacco in England, that the finely-granulated leaf became commonly established as a pungent perfume, and at length introduced the costly and elegant snuff-box."

So early, however, as the beginning of the reign of James I., a "taker of tobacco," was to be furnished with an apparatus greatly resembling that of a modern Scotch mull, when supplied with all its accustomed instruments, like the ram's-head boxes mounted in gilt silver, and displayed in several parts of the Great Exhibition. "Before the meat came smoking to the board," says Dekker, in his *Gull's Horn-book*, in 1609, "our gallant must draw out his tobacco-box, *the ladle for the cold snuff into the nostrils*, the tongs and priming-iron, all which artillery may be of gold and silver, if he can reach the price of it." Both the practice and apparatus of taking snuff are described by Howell, in 1646, as quite common in other countries; since he says, "The Spaniards and Irish take tobacco most in powder or smutchin, and it mightily refreshes the brain; and I believe there's as much taken this way in Ireland as there is in pipes in England. One shall commonly see the serving-maid upon the washing-block, and the swain upon the ploughshare, when they are tired with their labour, take out their boxes of smutchin, and draw it into their nostrils with a quill; and it will beget new spirits in them, with a fresh vigour to fall to their work again." The word erroneously printed "smutchin" by Howell, is accurately *sneeshin*, a vulgar name for snuff, which causes sneezing: and hence "sneeshing-mill" (sometimes corrupted into *mull*), is the Scottish name for snuff-box. Down to the middle of the eighteenth century, the "sneeshin-horn," with the spoon and hare's foot attached to it by chains, appears to have been regarded as so completely a national characteristic, that when Baddeley played Gibby in *The Wonder*, with Garrick and Mrs. Barry, he came on the stage with such an apparatus.

In the early part of the eighteenth century, in England, fashionable snuff-boxes had probably reached the highest degree of variety and luxury. In the *Tatler*, published on Tuesday, March 7th, 1710, several gold snuff-boxes are noticed, which came out last term; but that a new edition would be put out on Saturday next, which would be the only one in fashion until after Easter. "The gentleman," continues the notice, "that gave fifty pounds for the box set with diamonds, may show it till that time, provided he goes to church, but not after that time, there being one to be published on Monday, which will cost four score guineas." These costly articles so happily satirized by Steele, are represented as the productions of a fashionable toy-man, named Charles Mather, popularly known under the name of the "Bubble Boy."

The *Scotch snuff-box*, which has long been renowned for the perfection of its hinge and the close fitting of the cover, is cut out of solid wood, the description chiefly employed being the sycamore or plane-tree. Mr. W. Chambers states that this is the timber used at Old Cumnock; and that a piece of rough wood which costs twenty-five shillings, will make snuff-boxes to the value of £3,000. In the manufactory of the Messrs. Smith, of Mauchline, which is one of the largest, about eighty artizans are employed, who have been instructed in the works. The workmen earn from sixteen to twenty-four shillings per week, according to their skill and the department in which they are engaged; and the women from seven to nine shillings per week. An artist capable of making a copy of an oil-painting, earns thirty shillings per week. There were two exhibitors of snuff-boxes in the Austrian section, one of whom, P. Bigaglia, contributed some beautiful specimens, composed of a sparkling glass, called artificial aventurine, which is a silicate of oxide of copper. The reduced copper exists in the form of minute crystals, which, under the microscope, present a most splendid appearance. The other exhibitor sent examples of papier-maché snuff-boxes, remarkable for their cheapness. In the Chinese court there was a beautifully-carved snuff-box, sculptured out of English cannel-coal, which was taken to China for that purpose by the exhibitor, Captain Shea. The carving, which, it appears, occupied the Chinese artist a fortnight, cost the exhibitor only £2 sterling.

The *Indian* courts contained several examples of snuff-boxes, the most curious being —the gourd snuff-boxes, mounted in gold and silver, from Scinde; a snuff-box made from a cocoa-nut, highly polished; another from the bilva fruit; and a beautiful specimen made from buffalo-horn, inlaid with metal. *St. Helena* contributed snuff-boxes made from the willow-tree under which the remains of the great Napoleon reposed until their removal to France, and also from a willow-tree which he planted behind the library at Longwood. From *Van Diemen's Land*, J. Milligen exhibited several specimens, interesting from the variety of the materials from which they were made; comprising a globular snuff-box turned out of the tooth of the sperm-whale, which is employed in the colony for stick-heads and similar purposes; a turned snuff-box of iron-wood; one of the Huron pine; and one of the musk-wood of Tasmania. The beautiful examples of snuff-boxes in the French department were as peculiar in their style as the Laurence-kirk snuff-boxes in theirs, and the manufacture of them appears to be confined to France if not to Paris. These boxes, which were quite remarkable for the accuracy with which the hinge was made, and the close fittings of the lid, were usually lined with a veneer of tortoiseshell, very highly polished. The outside, or body of the box, was composed of various materials, as ivory, tortoiseshell, and rhinoceros-horn, and also of petrified wood and other woods, as the maple, the olive, rosewood, and several sorts of palms cut across the grain. Some examples were very tastefully, *not showily*, ornamented with neat gold and silver mounts; but none, perhaps, were more elegant than those made of the palm-tree, cut across the grain.

We will not, however, pursue our investigations any further upon this subject. If our readers consider we have already dwelt too long upon it, we shall take shelter under the great names that are to be found among those who have patronised the snuff-box. What illustrious personages might we not cite. The shade of the great Napoleon rises before us; and———but a more familiar example will suffice. Of Sir Joshua Reynolds it is recorded by Goldsmith, that—

> "When they talk'd of their Raphael's, Correggio's and stuff
> He shifted his trumpet—and only took snuff."

CHAPTER XXXV.

SILKS.

FIRST MENTIONED BY ARISTOTLE—ALLUDED TO IN THE NEW TESTAMENT—DESCRIBED BY BASIL —GALEN—ABUNDANT IN CHINA—ITS INTRODUCTION INTO EUROPE—MODE OF PREPARATION— DIFFERENT VARIETIES OF—OPINION OF THE JURY ON FRENCH, ITALIAN, TURKISH, INDIAN, CHINESE, AND ENGLISH SILK — SILK MANUFACTURES — SPITALFIELDS — MANCHESTER— COVENTRY—RIBBONS—SHAWLS.

HAVING in a former part of this work devoted a chapter to textile materials—worsted, alpaca, and mohair; we shall now turn our attention to the costlier production of the

> "———— Millions of spinning worms
> That in their green shops weave the smooth hair'd-silk,"

and premise our observations with the following able historical account by Professor Owen in his admirable lecture on the "raw materials" from the animal kingdom.

"From a product of the most gigantic of animals," says the learned lecturer, "I next

proceed to notice one derived from a seemingly insignificant insect; yet it is the most costly of all raw materials for textile purposes,—I allude to silk. The most valuable kind of silk, and that which is the subject of the most extensive and pains-taking culture, is the secretion of the larva of a species of moth, indigenous to China, called, *par excellence*, the 'silk-moth,' and by entomologists *Bombyx mori*, from its native and favourite food, the leaves of the mulberry-tree. Raw silk was imported into Europe long before the insect which produces it; but the antiquity of this raw material for the richest of our textile fabrics, by no means goes so far back as that of wool. There is no certain reference to silk in any part of the Old Testament; the Hebrew word so rendered by King James's translators (Ezekiel, xvi., 10, 13) may signify "fine flax;" and the learned Braunius concludes that silk was unknown to the Hebrews. The first definite mention of silk, with a notice of the creature producing it, is in the fifth book of the *Historia Animalium* of Aristotle. He indicates the island of Cos as the place where silk was woven into cloth: and he mentions (cap. xix., p. 850, Duval) four states of the insect which produces silk, under the terms *skolex*, *kampe*, *bombulios*, and *nekudalos*; and these terms were understood by ancient writers after Aristotle, and no doubt correctly, to signify the states which modern entomologists would call the 'young larva,' the mature or 'spinning larva,' the 'pupa,' with its cocoon, and the 'imago,' or perfect insect. In the New Testament, the use of silk is mentioned once unmistakeably (Revelation, xviii. 12). The beautiful illustration of the Christian doctrine of the resurrection, which Basil, in the year of our Lord 370, drew from insect-metamorphoses, shows plainly that he had obtained his facts by a perusal of the famous zoological treatise of Aristotle:—'What have you to say, who disbelieve the assertion of the Apostle Paul concerning the change at the resurrection, when you see many of the inhabitants of the air changing their forms? Consider, for example, the account of the horned worm of India, which, having first changed into a caterpillar (*eruca* or *veruca*), then in process of time becomes a cocoon (*bombylius* or *bombulio*), and does not continue even in this form, but assumes light and expanding wings. Ye women, who sit winding upon bobbins the produce of these animals —namely, the threads which these Seres send to you for the manufacture of fine garments —bear in mind the change of form in this creature, derive from it a clear conception of the resurrection, and discredit not that transformation which Paul announces to us all.' Galen judiciously recommends silk threads for tying blood-vessels in surgical operations. The Roman poets and satirists made frequent mention of the luxurious silken clothes and attire, which were introduced at an enormous expense during the period of the empire. The silk so obtained was exported from Persia and India; but whether the *Bombyx mori* had been introduced into those countries at that period, or whether the raw material was obtained from China, is uncertain. That silk was most abundant in China we learn from the oldest records of the singular people inhabiting that country, where, from an early period, not only the mandarins, but all persons in easy circumstances, as well male as female, have worn silk, satin, or damask clothes. Even the uniforms of the soldiers were made then, as now, of this elsewhere considered so valuable material. Of the wild original of the *Bombyx mori* there is the same incertitude as with regard to most domesticated animals. The description which is given by M. Bertin in his work entitled *China, its Costumes, Arts, and Manufactures*, seems to refer, as M. Latreille remarks, to the large *Phalæna atlas*. The wild silk-worm is there said to curve a leaf into a kind of cup, and then to form a cocoon as large and nearly as hard as a hen's egg. These wild cocoons are so strong and so compact, that the insects have great difficulty in extricating themselves, and therefore remain enclosed from the end of the summer to the spring of the following year. These moths fly well. The domestic silk-moth, on the contrary, soon extricates itself, and has very feeble powers of flight. The wild silk-moth feeds

indifferently on the ash, oak, and nagara; the *Bombyx mori,* as its name implies, feeds by choice, if not exclusively, on the leaves of the mulberry-tree.

"I have now to speak of the introduction of the silk-worm into Europe. According to Procopius, the *Bombyx mori* was first introduced into Europe in the reign of the Emperor Justinian, by two Nestorian monks who had travelled in Serinda,—which, whether it be India or China is uncertain,—and who succeeded in bringing a quantity of eggs,—secured (according to Photius) in a hollow cane,—to Constantinople, where they were hatched, and the larva fed and reared on the leaves of the black mulberry. The breeding of silk-worms in Europe was confined for six centuries to the Greeks of the Lower Empire. In the twelfth century, the rearing of silk-worms and the manufacture of silk were introduced by Roger, king of Sicily, into Palermo, whence this important branch of industry was rapidly and successfully established in Italy, Spain, France, England, and subsequently in most of our colonies possessing a suitable climate. Silk is a secretion of a pair of long glandular tubes, called 'sericteria,' which terminates in a prominent pore or spinnaret on the under-lip. Before their termination they receive the secretion of a smaller gland, which serves to glue together the two fine filaments from the two 'sericteria;' the apparently single thread being, in reality, double, and its quality being effected by the equality, or otherwise, of the secreting power of the 'sericteria.' The silk-worm commences spinning when it is full-grown, in some convenient spot affording points of attachment for the first-formed thread, which is drawn from one part to the other until the body of the larva becomes loosely enclosed by the thread. The work is then continued from one thread to another, the silk-worm moving its head and spinning in a zigzag way, in all directions within reach, and shifting the body only to cover the part which was beneath it. The silken case so formed is called the 'cocoon.' During the period of spinning the cocoon, which usually takes five days for its completion, the silk-worm decreases in size and length considerably; then casts its skin, becomes torpid, and assumes the form of the chrysalis. The main object of the silk-worm breeder is to obtain cocoons of a large size, composed of a long, strong, very fine, even, and lustrous thread. These properties of the silk were found realised in the highest degree in the specimens transmitted from France, in which country the development of the silk-worm has for a long period exercised the care and pains of many able silk-worm breeders, and of late years has been the object of systematic advancement by the Central Society of Sericiculture of France. Much skill is exercised—I wish I could add without cruelty—in the art of killing the pupa and extracting it from the cocoon, and in preparing the latter for unwinding the delicate thread; heat being the agent of destruction in most of the processes, as it seems to have been in the remotest historic times in China. The method there employed, according to the old French missionaries in China, is as follows:—'The extremities of the cocoon are first cut off with a pair of scissors; they are then put in a canvas bag and immersed for an hour or more in a kettle of boiling lye, which dissolves the gum. When this is effected, they are taken from the kettle, are pressed to expel the lye, and are left till the next morning to dry. Whilst they are still moist the chrysalis is extracted from each cocoon, which is then turned inside out to make a sort of cowl. They are then easily wound into thread.

"An accomplished author, who has celebrated the Great Exhibition in a work full of apt and striking allusions, beautifully apostrophises the 'wondrous worm, self-shrouded in thy silken tomb! Anon to emerge in brighter form, on higher life intent; but that stern man thy mystic transformation intercepts, with fatal fires, consuming tenant for the sepulchre.' The results of all the most approved modes of rearing the silk-worm and preparing the cocoons were exhibited, and might be studied with advantage, in the Crystal Palace. The *Bombyx mori,* having been bred and reared under the special care and

management of man during a long succession of ages, may be regarded as a domesticated species of insect; and it has become the subject, as in the higher domesticated races, of varieties, of which those called 'Sina,' 'Syrie,' and 'Novi,' in France, are examples. The 'Sina' variety of the silk-worm is known and esteemed for the pure whiteness of its silk, the thread of which is fine, but weak, and not very lustrous. The 'Syrie' variety is of large size, produces a cocoon abundant in silk, but the thread is rather coarse, and inclines to a greenish tint. The 'Novi' race is small, but the cocoons are firm and well made, and the silk has a yellowish tint. The specimens of cocoons and raw silk exhibited in the French department were numerous, and the degrees of excellence hardly to be discriminated in the finest examples selected for the award of the prize medal. With regard to the superior quality of these raw silks and cocoons, the jury, by their recommendation of the award of the Council medal to the 'Central Society of Sericiculture of France,' desired to testify their admiration of the specimens exhibited by many members of that society, and their appreciation of the important influence which it has exercised in the improvement of this beautiful and valuable product of the animal kingdom. The jury, however, justly gave the honour of their first notice to the beautiful specimens shown by Major Count de Bronno Bronski, exhibitor of unbleached silk and silk cocoons from the Château de St. Selves, near Bordeaux, in the department de la Gironde. The cocoons were remarkable for their large size and regularity of form, and the silk for the unusual length of the thread, its natural pure white colour, its fineness, and lustre. The circumstances under which this superior quality of silk was obtained are certified in a report by a committee of the Agricultural Society of the Gironde, dated 28th April, 1847, to be as follows:—'In 1836 Major Bronski reared separately the eggs of the three varieties, 'Sina,' 'Syrie,' and 'Novi.' In 1837 he set apart the cocoons of the varieties 'Syrie' and 'Novi;' and on the exclusion of the *imago*, or perfect insect, he associated the males of the 'Novi' with the females of the 'Syrie;' and the hybrid ova were hatched at the ordinary period in 1838, the operations being repeated in 1839 and 1840. With regard to the race 'Sina,' M. Bronski, in 1837, separated the white from the black worms as soon as they were hatched. He then selected the largest and best shaped cocoons, and made a special collection of the eggs from the moths excluded from those cocoons. This procedure was repeated in 1838 and 1839; but in 1840 he associated the males excluded from the large cocoons of the black worms with the females excluded from those of the white worms. In 1841 he associated the males of the 'Sina' race with the hybrid females obtained from the above-described crossings of 'Novi' and 'Syrie' breeds. By these and similar experiments M. Bronski at length appears to have succeeded in obtaining a race of silk-worms not subject to disease, producing large and equal-sized cocoons of a pure white colour, the silk of which was equal in all its length, strong, and lustrous, and presenting an average length of thread of 1,057 metres.

"Very beautiful examples of raw silk were also transmitted from different parts of Italy; and amongst the Italian silks the first mention was due to those exhibited in Tuscany, which showed well all the desirable qualities of the cocoons and thread. From these the jury selected for the award of the prize medal the specimens of raw silk from silk-worms, fed upon leaves of the Philippine mulberry, exhibited by Professor Savi, of Pisa. In the department of Sardinia, the jury selected as deserving, for their excellent qualities, the prize medal, the silks exhibited by Messrs. H. Jacquet and Co., Messrs. Casissa and Sons, and Messrs. Rignon and Co. Many of the silks exhibited in the department of Turkey were of a very fine character, exhibiting a good length of thread, with the qualities of fineness, strength, elasticity, and lustre. The jury had great pleasure in awarding the prize medal to the School of Sericiculture at Broussa, as well as to some private exhibitors from Turkey. Very fine examples of silk were shown in the Indian

department, from which the jury selected, as meriting the prize medal, the following: D. Jardine, of Calcutta; Watson, of Surdah, Bengal; Mackenzie Brothers, of Bengal; Jennings, of Commercolly; W. M'Nair, of Surdah, Bengal. Besides the silk from the ordinary silk-worm (*Bombyx mori*), called in India *pat*, specimens of stronger and coarser kinds of silk were shown, from the *tussur*-moth (*Saturnia mylitta*), which feeds on the leaves of the *terminalia catappa* and *zizyphus jujuba*. The cloth woven from this silk is called '*tussur-cloth*,' and is made at Midnapore. The *moonga* silk is from the *Bombyx saturnia*, which feeds upon the same trees as the *tussur*. A piece of *moonga*-silk cloth, made in Assam, was exhibited. The *Phalæna cynthia* produces the *eri* silk. This species feeds upon the *ricinus communis*. The *eri* cloth is also woven at Assam. It is observed in India, that the *pat*, or true silk, from larvæ of the *Bombyx mori*, fed on mulberry-trees grown in a strong clay soil, is generally better, the cocoons being larger and of better colour. "In the Chinese department the quality of the silk developed in the native country of the silk-worm was worthily illustrated by the specimens exhibited by Yun-kee, of Shang-hae; to whom the jury, therefore, adjudged the prize medal. I must not quit the subject of silk without, finally, offering a tribute of praise to specimens of silk, from silk-worms reared on leaves of the white mulberry, at Godalming, Surrey, and exhibited by Mrs. Catherine Dodge, which, considering the unfavourable conditions of climate, showed qualities that deservedly elicited the award of honourable mention from our jury."

SILK MANUFACTURES.

There were few departments of the Exhibition which were examined with more interest than that of the silk manufacture, since it was one of those in which the well-known reputation and long-tried skill of our French neighbours promised to subject us to the severest test. Many well-meaning and intelligent people believed that, as regards our silk trade, if in no other department of manufacture, the Exhibition would have had a fatal tendency; since it would inevitably have shown us the poverty of our own productions, especially in an artistic point of view. Spitalfields was lukewarm, if not positively hostile. Macclesfield could not see its way until the eleventh hour; and it was only the fear of being absent, and thus suffering judgment to go by default, that led to any movement in either of these localities. Manchester and Coventry had some hopes that there might be points in which they might excel, and consequently set about the work with more spirit and determination, and the fullest possible intention of winning if they could, but, if beaten, that it should not be for want of a trial. Without claiming for our silk manufactures any super-excellence either of taste or judgment, it is not too much to say that there are points in which they certainly stand pre-eminent; and when the question of quality is discussed, no one need fear the results. Of late years there has been a constant tendency to avoid the production of decorated silks, and to pay more and more attention to those of a plain character. This has arisen since the period at which the restrictive duties were taken off French silks; and the manufacturer, who formerly depended upon his clandestine means for obtaining patterns of these foreign productions, and using them as designs for his own trade, was compelled to forego his piracies, and depend upon some original source. Now, unfortunately, he had altogether neglected the cultivation of the taste and talent around him; and in his hour of need the slender artistic means which he had been compelled to provide for the purpose of copying, failed him as a source of that originality by which alone he could hope to stand.

The disquietude, therefore, of the silk manufacturers of this country, and more particularly of Spitalfields, is to be accounted for in the fact that they were totally unprepared for such a competition as that in which they were called upon to take part; and having been so long used to depend upon others rather than upon themselves, they were certainly

not in the best possible condition to exert themselves with any effect. The display actually produced, however, only served to prove how much more might have been done had this habit of self-reliance been cultivated a little earlier, and the innovations of taste been regarded rather as a means whereby an extension could be given to trade, than as ruinous to certain exclusive interests which were never, after all, really benefited by the so-called protection afforded by antique restrictions. The examples of British silk manufacture occupied the gallery immediately at the head of the first staircase on the south side. The Spitalfields, or metropolitan silks, and the Coventry ribbons, were displayed in glass cases next the nave, and the Macclesfield and Manchester productions in a parallel line on the other side of the staircase. Nearly every class of silk goods was represented, and manufacturers, wholesale and retail dealers, were, strangely enough, found in competition, or at least in comparison, with each other. Messrs. Campbell, Harrison, and Lloyd, of Friday-street, City, exhibited some excellent specimens of figured moiré antique damask, rich brocades, and velvets. Stone and Kemp, Spital-square, a rich assortment of plain and fancy silks. Isaac Boyd, some admirable specimens of silk furniture damasks; and other houses kept up the reputation of Spitalfields for parasol silks, gros-de-Naples, satins, and velvets. Two specimens exhibited by the Spitalfields' School of Design, as the production of pupils of that institution, were practical illustrations of its utility when properly directed. The crowning representation, however, of Spitalfields, was the silk trophy, set up by Messrs. Keith, in the central avenue. This richly-clothed and decorated object formed a decided feature of the Exhibition, and consisted of a parallelogram of mirrors, with a wing at each of the angles, on which were draped the richest furniture damasks, in well-selected and effective colourings. The structure was divided into three tiers, and rose to the height of forty feet, above which were placed the flags and banner. The lower tier displayed the broad silks of the largest patterns; and, at certain angles, these were reflected in the mirrors, whilst selections of silks were arranged upon a plinth which supported the whole, an ornamental *fascia* completing the first compartment. From this rose the second tier, in which, however, too many silks were crowded, and the effect was impaired in consequence. Great credit is due to Messrs. Keith and Co. for the spirit and energy they displayed in taking up this costly illustration of their trade single-handed; and the examples of silk of which it was formed were, with a few exceptions, equally creditable to their skill and taste as manufacturers. Messrs. James Houldsworth and Co. were the exhibitors of silk from Manchester. Their specimens were all of a very high character. The large silk banner which occupied the centre of their compartment was executed specially for the Exhibition, and was composed of silk grown and manufactured in England. It was intended as a memorial of the late Mrs. Whitby, of Newlands, Southampton, who devoted so large a portion of her time and fortune to the promotion of the growth of silk in England, and was manufactured by Messrs. Houldsworth for her friend, Mrs. Wist. The embroideries by machinery, for which Messrs. James Houldsworth and Co. have been so long noted, were here displayed in all their accuracy of "repeat" and brilliancy of effect. Indeed, in all departments of the manufacture, this house sustained its reputation in a most satisfactory manner, the arrangements of the display being at once tasteful and effective. Messrs. Whitworth and Proctor's specimens, of a totally different class, were very admirable. Messrs. Harrop, Taylor, and Pearson's goods, which filled a glass case of similar design to that of Messrs. Whitworth and Proctor, thus balancing the arrangement on each side of Messrs. Houldsworth, were of a class for which Manchester is noted—plain silk goods, of excellent quality, at a comparatively low price; and it was as specimens of this class only that they were exhibited. At the back of the Manchester specimens, a miscellaneous collection of examples in silk and silk manufac-

tures was placed. In the centre, and occupying the largest portion, were some very excellent examples of furniture damasks, manufactured and exhibited by Mr. W. Grosvenor, of Kidderminster. The other exhibitors comprised those from Leek and Derby; and an interesting case of illustrations of the growth and process of silk manufacture, from the eggs of the silkworm to the finished goods, by Messrs. Hadwin and Sons, Heyroyd Mills, near Halifax; with specimens of dyed silks by Holdforth and Sons, of Leeds. The Macclesfield exhibitors were grouped together in a large glass case at the head of the stairs; and the special productions of that town were worthily represented by Messrs. Brocklehurst and Sons, H. and T. Wardle and Co., and Critchley, Brinsley and Co.; ladies' silk handkerchiefs and small silk shawls being the leading features. Of the colouring of many of the specimens the Jury spoke in the highest terms of commendation.

Ribbons.—The staple productions of the ancient city of Coventry occupied a prominent situation in the central south gallery, next to the nave, and were displayed in a long glass case, of more pretension to architectural beauty than was realized in its construction. Of the display here made it is only right to premise, that Coventry has hitherto aimed at manufacturing cheap ribbons, in which great effect is obtained at the smallest possible amount of labour and the minimum quantity of material; and the examples shown were, with very few exceptions, intended to illustrate the regular manufacture of the various houses who united to make this exposition of the ribbon trade. Each of the leading firms was represented, and each had evidently endeavoured to display the leading features of its own special trade. Thus, Messrs. Sturdy and Turner exhibited samples of ribbons remarkable for beauty of design and the application of steam power to their manufacture; and Messrs. Sharpy, Odell, and Jur exhibited illustrations of a medium quality of goods manufactured at Coventry. In order, however, to show how far the ribbon weavers of Coventry are capable of going beyond the ordinary character of goods upon which they are usually employed, and by the manufacture of which the commercial status of that city is kept up, it was wisely resolved, by a few spirited individuals, that a ribbon should be manufactured, and the cost of its production be defrayed by subscription, in order to ensure the production of such a specimen as would prove the capability of the Coventry workmen to produce better things than they usually have credit for, and to show that the element of price was always to be considered in the production of excellence. The ribbon thus manufactured, under the especial superintendence of a committee of manufacturers appointed for that purpose, was exhibited in the central compartment of the glass case which was set apart for its display, in a variety of colourings. Unfortunately, an engraving would give no adequate representation of the special beauties of this example; an illustration would, therefore, be useless, as its colourings, and the arrangement of its parts for the purposes of weaving, constitute the primary elements of its excellence; and, without believing that it is the very perfection of design and workmanship in ribbon manufacture, it was extremely interesting, as showing how far the energies and talent of our countrymen may be developed by judiciously-exercised encouragement, and the stimulus of an extraordinary circumstance, such as this Exhibition has proved to many of our manufactures. Let the Coventry men take a lesson from this, and, indeed, the Spitalfields men might do the same; and let them take care to produce at least one-first-rate specimen of their skill every year for the future, as a point of perfection at which their artisans should aim as far as possible, even in their ordinary productions.

Shawls.—The valuable and interesting display of British shawls was most judiciously arranged in the gallery on the south-western side of the transept, the London and Norwich contributions being placed in a series of elegantly-designed glass cases; and those

of Paisley in suitable compartments, either covered with glass or open, according to the character of the goods. When the great variety of production in this department of textile fabrics alone is taken into consideration, and it is remembered that the design may range from the most intricate India prize patterns to the most primitive of plaids, and yet present decided features of excellence *per se*, the importance of its complete illustration will be at once acknowledged. Nor is this application of the arts of design to be confined exclusively to the production of the patterns by the loom alone, since, of late years, most important improvements in the decoration of shawls have been effected by the application of printing by blocks; and the success which has attended this method was fully exemplified by the very beautiful and unique specimens exhibited by Mr. Charles Swaisland, of Crayford, Kent, one of the last of those London printers whose reputation has been eclipsed by the mechanical contrivances and rapid methods of production of their Lancashire rivals. The *barège* shawls of this unrivalled printer have long held the command of the market: and the selection exhibited will only serve to enhance the reputation acquired by the experience of nearly half a century. Messrs. Kerr and Scott, of St. Paul's Church-yard, exhibited largely and in great variety, alike in printed and woven fabrics. Messrs. Webber and Hairs, of Milk-street, City; and Messrs. Keith and Shoobridge, of Wood-street, also displayed an admirable selection. The Norwich exhibibitors, too, made a most interesting display in both shawls and figured poplins, brocades, and chinés. The Paisley contributions were very extensive. The Indian long shawls of Mr. R. Kerr have been held in high esteem for many years past, and the specimens he exhibited sustained his reputation. The gay colours of many of the tartan shawls and plaids grouped well with the more sober hues of the fancy plaids, in which tertiary tints and neutrals were admirably contrasted with the vivid colours of broad borders and fringes. Many of the printed shawls were very excellent; and the embroidered ones, though out of place here, served to give effect to those around.

END OF VOL. II.